

# MUS 313 Auditory Theory: Applied Tuning Systems

## Steven M. Miller

### Reading List

#### Topics:

#### The Harmonic Series and an Introduction to Tuning Theory

*Required:*

Ernest G. McClain, "Appendix IV: Introduction to the Monochord" in McClain *The Pythagorean Plato*, Nicolas-Hays 1984

#### Brief Review of Acoustics and Psychoacoustics

*Required:*

William A. Sethares, "The Science of Sound" in Sethares *Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

William A. Sethares, "Sound on Sound" in Sethares *Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

*Recommended:*

David B. Doty, "Acoustic and Psychoacoustic Background" in Doty *The Just Intonation Primer*, 3<sup>rd</sup> Ed., Other Music, Inc. 2002

Scott R. Wilkinson, "Acoustics and Psychoacoustics" in Wilkinson *Tuning In*, Hal Leonard 1988

*Optional:*

David Butler, "Essentials of Acoustics" in Butler *The Musician's Guide to Cognition and Perception*, Schirmer 1992

#### Pitch Perception

*Required:*

David Butler, "The Sensory Attributes of Pitch" in Butler *The Musician's Guide to Cognition and Perception*, Schirmer 1992

*Recommended:*

John R. Pierce, "Introduction to Pitch Perception" in Perry R. Cook *Music, Cognition, and Computerized Sound*, MIT Press 1999

*Optional:*

Rudolf Rasch and Reiner Plomp, "The Perception of Musical Tones" in Diana Deutsch *The Psychology of Music*, 2<sup>nd</sup> Ed., Academic Press 1999

David Butler, "Cognitive Aspects of Pitch in Music" in Butler *The Musician's Guide to Cognition and Perception*, Schirmer 1992

#### Timbre Perception

*Required:*

David Butler, "The Sensory Attributes of Timbre" in Butler *The Musician's Guide to Cognition and Perception*, Schirmer 1992

*Recommended:*

Max V. Mathews, "Introduction to Timbre" in Perry R. Cook *Music, Cognition, and Computerized Sound*, MIT Press 1999

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*Optional:*

David Butler, "Cognitive Aspects of Musical Timbre" in Butler *The Musician's Guide to Cognition and Perception*, Schirmer 1992

**The Language of Intonation: Ratios, primes, cents, logarithms**

*Required:*

David B. Doty, "Basic Definitions, Conventions, and Procedures" in Doty *The Just Intonation Primer*, 3<sup>rd</sup> Ed., Other Music, Inc. 2002

*Recommended:*

Harry Partch, "Definitions Pertaining to Intonation" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

Harry Partch, "The Language of Ratios" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

Harry Partch, "Basic Monophonic Concepts" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

*Optional:*

Scott R. Wilkinson, "Music, Mathematics and Microtuning" in Wilkinson *Tuning In*, Hal Leonard 1988

**An Overview of Intervals and Scales**

*Required:*

William A. Sethares, "Musical Scales" in Sethares *Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

Scott R. Wilkinson, "Alternate Tunings and Scales" in Wilkinson *Tuning In*, Hal Leonard 1988

*Recommended:*

Harry Partch, "Analysis of the 5-Limit" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

Harry Partch, "Application of the 11-Limit" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

*Optional:*

Edward M. Burns, "Intervals, Scales, and Tuning" in Diana Deutsch *The Psychology of Music*, 2<sup>nd</sup> Ed., Academic Press 1999

**'Consonance,' 'Dissonance,' and Scales**

*Required:*

William A. Sethares, "Consonance and Dissonance of Harmonic Sounds" in Sethares *Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

*Recommended:*

Harry Partch, "The One-Footed Bride" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

John R. Pierce, "Consonance and Scales" in Perry R. Cook *Music, Cognition, and Computerized Sound*, MIT Press 1999

*Optional:*

James Tenney, *A History of 'Consonance' and 'Dissonance'*, Excelsior 1988

Roger Shepard, "Tonal Structure and Scales" in Perry R. Cook *Music, Cognition, and Computerized Sound*, MIT Press 1999

**Historical Tuning Systems**

*Required:*

Scott R. Wilkinson, "The History of Tuning and Temperament" in Wilkinson *Tuning In*, Hal Leonard 1988

Harry Partch, "A Thumbnail Sketch of the History of Intonation" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

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*Recommended:*

Harry Partch, "Pythagoreanism" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

*Optional:*

Kyle Gann, "An Introduction to Historical Tunings" from online source <http://www.kylegann.com/histune.html> accessed October 20, 2005

**Just Intonation**

Required:

David B. Doty, "Introduction" in Doty *The Just Intonation Primer*, 3<sup>rd</sup> Ed., Other Music, Inc. 2002

David B. Doty, "The Ladder of Primes: Two, Three and Five" in Doty *The Just Intonation Primer*, 3<sup>rd</sup> Ed., Other Music, Inc. 2002

David B. Doty, "The Ladder of Primes: Seven and Beyond" in Doty *The Just Intonation Primer*, 3<sup>rd</sup> Ed., Other Music, Inc. 2002

*Recommended:*

Harry Partch, "Just Intonations" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

Paul F. Zweifel, "Just Tuning and the Unavoidable Discrepancies" in *Indiana Theory Review* vol. 15 no. 2, Indiana University 1994

*Optional:*

Kyle Gann, "Just Intonation Explained" from online source <http://www.kylegann.com/tuning.html> accessed October 20, 2005

**N-tet: Equal Temperaments**

Required:

Harry Partch, "Equal Temperaments" in Partch *Genesis of a Music*, 2<sup>nd</sup> Ed., Da Capo 1974

*Recommended:*

Max V. Mathews and John R. Pierce, "The Bohlen-Pierce Scale" in Mathews and Pierce *Current Directions in Computer Music Research*, MIT Press 1989

**Timbre and Tuning**

Required:

William A. Sethares, "Related Spectra and Scales" in Sethares *Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

Wendy Carlos, "Tuning: At the Crossroads" in *Computer Music Journal* Vol. 11 No. 1, MIT Press 1987

*Recommended:*

William A. Sethares, "A Bell, A Rock, A Crystal" in Sethares *Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

*Optional:*

William A. Sethares, "From Tuning to Spectrum" in Sethares *Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

William A. Sethares, "Spectral Mappings" in Sethares *Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

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**Dynamic Tuning**

*Required:*

Larry Polansky, "Paratactical Tuning: An Agenda for the Future Use of Computers in Experimental Intonation" in *Computer Music Journal* Vol. 11 No. 1, MIT Press 1987

William A. Sethares, "Adaptive Tunings" in *Sethares Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

*Recommended:*

Martin Bartlett, "Relative Ratio Tuning: An Intonational Strategy for Performance Systems" in *Leonardo Music Journal* Vol. 1 No. 1, Pergamon Press 1991

*Optional:*

William A. Sethares, "A Wing, An Anomaly, A Recollection" in *Sethares Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

**Non-Rational Tunings**

*Required:*

William A. Sethares, "The Gamelan" in *Sethares Tuning, Timbre, Spectrum, Scale*, 2<sup>nd</sup> Ed., Springer Verlag 2004

*Recommended:*

Larry Polansky, "Interval Sizes in Javanese Slendro" in *Balungan* Vol. 1 No. 2, American Gamelan Institute 1985

*Optional:*

Edward C. Carterette and Roger A. Kendall, "On the Tuning and Stretched Octave of Javanese Gamelans" in *Leonardo Music Journal* Vol. 4 No. 1, MIT Press 1994

Frédéric Voisin, "Musical Scales in Central Africa and Java: Modeling by Synthesis" in *Leonardo Music Journal* Vol. 4 No. 1, MIT Press 1994

**Notational Issues**

See various scores by Lou Harrison, Ben Johnston, James Tenney, Harry Partch, etc. for examples of non-12-tet notation.

**Acoustic Instruments**

*Required:*

David B. Doty, "Practical Just Intonation with Real Instruments" in Doty *The Just Intonation Primer*, 3<sup>rd</sup> Ed., Other Music, Inc. 2002

*Recommended:*

See the relevant sections of the following books on musical acoustics.

David M. Howard and James Angus, *Acoustics and Psychoacoustics*, 2<sup>nd</sup> Ed., Focal Press 2001

Richard E. Berg and David G. Stork, *The Physics of Sound*, 3<sup>rd</sup> Ed., Prentice Hall 2005

Donald E. Hall, *Musical Acoustics*, 3<sup>rd</sup> Ed., Brooks/Cole 2002

Robert D. Finch, *Introduction to Acoustics*, Prentice Hall 2005

John M. Eargle, *Music, Sound, Technology*, 2<sup>nd</sup> Ed., Springer Verlag 1995

William J. Strong and George R. Plitnik, *Music Speech Audio*, Soundprint 1992

Michael J. Wagner, *Introductory Musical Acoustics*, Contemporary Publishing 1994

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Reading List

**MIDI, Electronic, and Computer Instruments**

*Required:*

David B. Doty, "Practical Just Intonation with Real Instruments" in Doty *The Just Intonation Primer*, 3<sup>rd</sup> Ed., Other Music, Inc. 2002

*Recommended:*

See owner's/user's manuals for synthesizers and software environments such as the Korg X5DR, Sequential Circuits Prophet-5, Scala, Max/MSP, Csound, Cubase SX, and the MIDI Tuning Specification protocol online at <<http://www.midi.org/about-midi/tuning.shtml>> and <<http://www.microtonal-synthesis.com/MIDI tuning.html>>.

**Creative Examples and Miscellaneous**

*Optional:*

Leta E. Miller and Frederic Lieberman, "Tuning and Temperament" in Miller and Lieberman *Composing a World; Lou Harrison, Musical Wayfarer*, University of Illinois Press 2004

Heidi Von Gunden, "Just Intonation" in Von Gunden *The Music of Lou Harrison*, Scarecrow Press 1995

Lou Harrison, *Lou Harrison's Music Primer*, C. F. Peters 1971

Heidi Von Gunden, "Experiments in Just Intonation" in Von Gunden *The Music of Ben Johnston*, Scarecrow Press 1986

Heidi Von Gunden, "Just Intonation as a Compositional Resource" in Von Gunden *The Music of Ben Johnston*, Scarecrow Press 1986

Heidi Von Gunden, "Scalar Research and Tonality Regained" in Von Gunden *The Music of Ben Johnston*, Scarecrow Press 1986

Ben Johnston, "Proportionality and Expanded Musical Pitch Relations" in *Perspectives of New Music*, Fall/Winter, Perspectives of New Music, Inc. 1966

Ben Johnston, "Rational Structure in Music" in *ASUC Proceedings I/II*, American Society of University Composers 1976/77

Derek Bermel, "Ben Johnston: Interview with Derek Bermel, 1995" from online source <http://www.parisatlantic.com/magazine/interviews/johnston.html> accessed October 22, 2005

Kyle Gann, "Anatomy of an Octave" from online source <http://www.kylegann.com/Octave.html> accessed October 20, 2005

Larry Polansky, *Pitch, Harmony, and Experimental Intonation: An experimental intonation primer*, unpublished notes 1997

James Tenney, "The Several Dimensions of Pitch" in Clarence Barlow *The Ratio Book (Feedback Papers 43)*, Feedback Studio Verlag 2001

James Tenney, "John Cage and the Theory of Harmony" in *Soundings* 13, Soundings Press 1984

Freff, "Tuning In to Wendy Carlos" from online source [http://emusician.com/em\\_spotlight/wendy\\_carlos/](http://emusician.com/em_spotlight/wendy_carlos/) accessed January 15, 2006

Alain Daniélou, *Music and the Power of Sound; The Influence of Tuning and Interval on Consciousness*, Revised Ed., Inner Traditions 1995

Joscelyn Godwin, *Harmonies of Heaven and Earth: Mysticism in Music from Antiquity to the Avant-Garde*, Inner Traditions 1995