# Graduate Study in Architectural Acoustics within the Durham School at the University of Nebraska – Lincoln

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*Durham School of Architectural Engineering and Construction, University of Nebraska-Lincoln*

## ABOUT THE PROGRAM

- Architectural Engineering Program started in 1998
- Housed at the Peter Kiewit Institute in Omaha, Nebraska
- One of three programs in the UNL Durham School of Architectural Engineering and Construction ($30M endowment)
- Eleven tenure/tenure-track faculty (two in acoustics) and eight affiliated faculty
- 250+ students and growing
- Degrees offered:
  - ❖ Accredited 5 year (4+1) program – Bachelor's/Master's of Architectural Engineering (MAE)
  - ❖ Master's of Science (M.S.)
  - ❖ Doctor of Philosophy (Ph.D.)



## GRADUATE COURSES IN ACOUSTICS

**AE 8300 – Advanced Noise Control**
Texts: Bies and Hansen; Wilson; ASHRAE Applications Handbook
Acoustic sources, sound power, HVAC noise control, vibration control, enclosures, barriers, mufflers, active noise control, outdoor sound propagation

**AE 8330 – Advanced Architectural Acoustics**
Texts: Long; Kuttruff
Wave/modal acoustics, statistical/geometrical acoustics, subjective qualities + objective measures, modeling of room acoustics, design of spaces

**AE 8350 – Electroacoustics**
Texts: Beranek; Eargle and Foreman
Circuit analogies, transducer types, equipment, directivity, calibration, sound reinforcement system design, speech intelligibility

**AE 9300 – Current Topics in Architectural Acoustics**
Texts: Recent peer-reviewed journal articles
Students lead topic presentation, study guides, and discussion

**AE 8940 - Assorted Special Topics Classes**
Acoustic Measurement and Signal Processing; Absorption and Reflection; Computer Modeling and Auralization; ASA Student Design Competition

*Other UNL graduate acoustic courses:* Engineering Acoustics, Vibration Theory and Applications, Hearing Science, Psychoacoustics, Auditory Signal Processing, Speech Perception and Processing, +



## FACULTY RESEARCH INTERESTS

**Lily M. Wang, PhD, PE, FASA, INCE Bd. Cert. (faculty member since 2000)**

- ❖ Effects of noise and reverberation on human perception and performance
  - − Speech comprehension and student achievement in learning environments
  - − Thresholds of annoyance from tones in noise
- ❖ Linking room acoustic subjective perception and objective metrics
  - − Just Noticeable Difference (JND) of reverberation time
  - − Perception of reflection density
- ❖ Computer modeling and prediction of room acoustics
  - − Impact of time-varying source directivity
- ❖ Uncertainty in room acoustic measurements

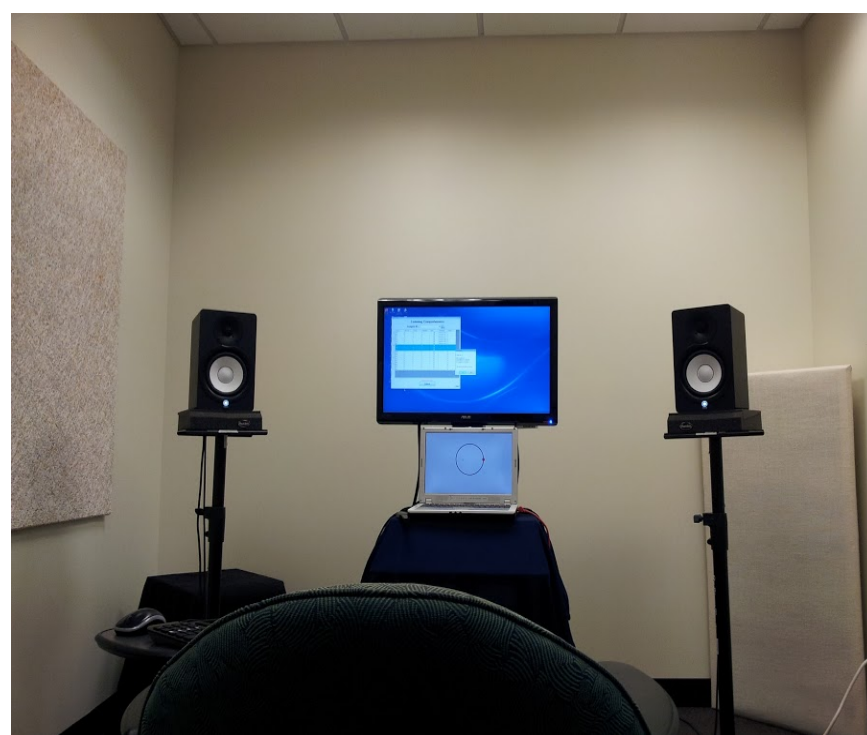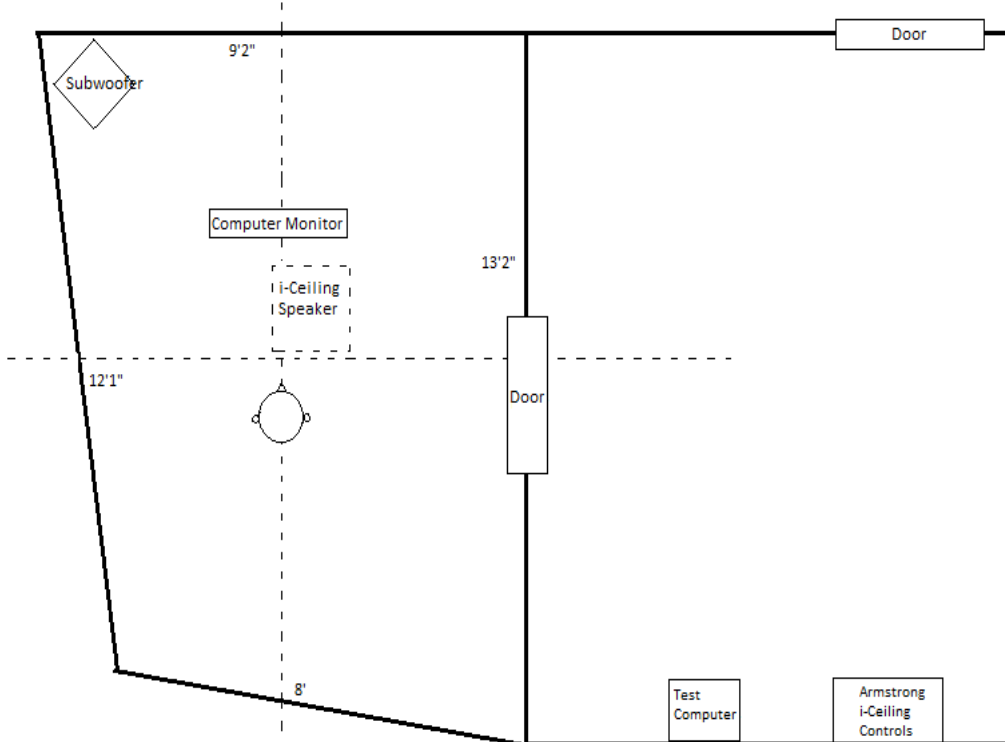**Erica E. Ryherd, PhD, LEED AP (faculty member since 2014)**

- ❖ Hospital acoustics
  - − Improving acoustic measurement and characterization techniques
  - − Linking sounds to the psychological and physiological responses of occupants
  - − Identifying and evaluating acoustical treatments and noise mitigation strategies
- ❖ Environmental noise
- ❖ Sustainable buildings
- ❖ Acoustic venues

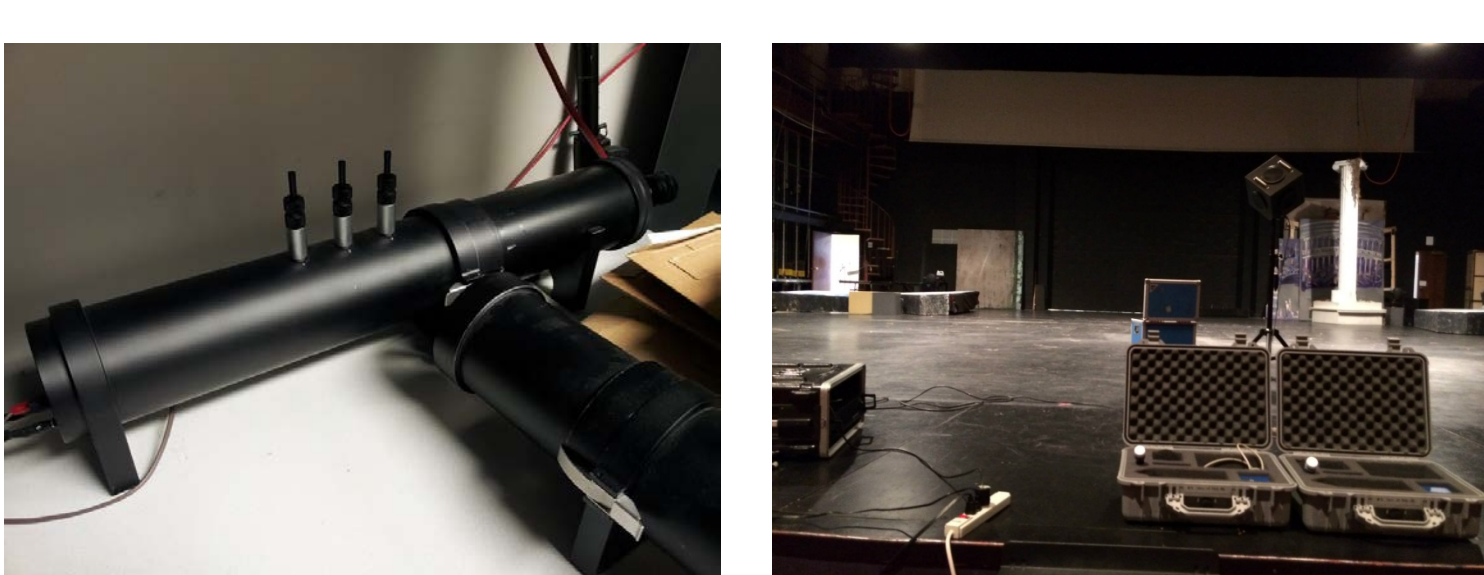## FACILITIES AND EQUIPMENT

**Nebraska Test Chamber**

- Acoustically isolated test chamber and control room replicates office environment



**Sound Booth**



**Assorted Equipment**



## ACTIVITIES

**Nebraska Acoustics Group (NAG)**
- Approximately 12-15 members, undergraduate and graduate students
- One hour meeting every two to three weeks (+ social events!)
- Share acoustic news and research
- One member presents on ongoing research at each meeting
- http://nebraskaacousticsgroup.org/

**University of Nebraska Student Chapter of the ASA (UNASA)**
- First ASA student chapter in the world
- Events include:
  - − Guest lecturers
  - − Acoustics outreach at local high schools
  - − Tours of performing arts and acoustics related facilities
  - − Local venue measurement team
  - − http://engineering.unl.edu/student-organization-unasa

## CURRENT STUDENTS

| | |
|---|---|
| Zhao (Ellen) Peng (PhD 2014) | Effects of room acoustics and foreign accent on speech comprehension by native and non-native English-speaking listeners |
| Hyun Hong (PhD 2015) | Subjective perception of varying reflection densities in room impulse responses |
| Joonhee Lee (PhD 2015) | The effects of tones in noise on human annoyance and performance |
| Matthew Blevins (PhD 2016) | Design and optimization of membrane-type acoustic metamaterials using genetic algorithms |
| Sungbeen Cho (PhD 2017) | Architectural Acoustics |
| Jennifer Francis (MS 2014) | Determining thresholds of annoyance to tones in noise |
| Devin Wong (MS 2015) | Relationship between acoustics and student achievement in high performance 'green' buildings |
| Madeline Davidson (MS 2016) | Architectural Acoustics |



## WE'RE PROUD OF OUR ALUMNI!

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|---|---|
| Erica Bowden Ryherd (PhD 2006) | Assistant Professor in the Durham School of Architectural Engineering and Construction, University of Nebraska – Lincoln |
| David T. Bradley (PhD 2006) | Associate Professor in Physics and Astronomy, Vassar College, Poughkeepsie, NY |
| Jonathan Rathsam (PhD 2008) | NASA Langley Research Center, Hampton, VA |
| Michelle Vigeant (PhD 2008) | Assistant Professor in Acoustics and Architectural Engineering, Penn State University, State College, PA |
| Lauren Ronsse (PhD 2011) | Assistant Professor in Audio Arts and Acoustics, Columbia College, Chicago, IL |
| Carl Hart (PhD 2014) | Postdoc with US Army Corps of Engineers Research Lab, Hanover, NH |
| Alicia Wagner Larsen (MS 2008) | Acentech , Cambridge, MA |
| Norman Philipp (MS 2009) | Assistant Professor in the School of Construction at Pittsburg State University, Pittsburg, KS |
| Christopher Ainley (MS 2012) | Wrightson, Johnson, Haddon and Williams, Inc., Dallas, TX |
| Caleb Sieck (MS 2013) | PhD student in Electrical Engineering at University of Texas at Austin |
| Andrew Hathaway (MS 2013) | Acoustical Design Collaborative, Baltimore, MD |
| Marc Choiniere (MAE 2008) | RPG Diffusor Systems, Inc., Denver, CO |
| David Manley (MAE 2008) | D. L. Adams Associates, Denver, CO |
| James Cottrell (MAE 2012) | Sextant Group, Pittsburgh, PA |
| Eric Powell (MAE 2012) | Paradise Theater, IL |
| Adam Buck (MAE 2013) | HDR Engineering, Inc., Minneapolis, MN |
| Josh Thede (MAE 2014) | SSA Acoustics, Seattle, WA |