



**Graduate Seminar (EEL 6936)**  
**Department of Electrical Engineering**  
**[http://ee.eng.usf.edu/Grad\\_Seminar](http://ee.eng.usf.edu/Grad_Seminar)**

**Dr. James Randa**  
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NIST, Boulder, CO

Friday, November 20, 2015, 3:30-4:30 p.m.  
Engineering Building II (ENB) Room 109

**Accurate Noise Measurements**  
**Abstract**

This talk will give an overview of the metrology of microwave thermal noise (particularly as developed and practiced at NIST). Part I will review basic measurements of noise temperature of noise sources and the noise figure of amplifiers, including consideration of the uncertainties in such measurements. This will include a discussion of measurements performed on a cryogenic amplifier with effective input noise temperature as low as  $1.65 \text{ K} \pm 0.18 \text{ K}$  (corresponding to a noise figure of  $0.024 \text{ dB} \pm 0.003 \text{ dB}$ ). Part II of the talk will focus on amplifier and transistor noise parameters. We will review noise-parameter representations and measurement methods, as well as the associated uncertainty analysis. Finally, we will discuss verification methods for noise-parameter measurements and the use of a simulation program to study possible strategies for improving the measurements

**Biography**



James Randa received the Ph.D. degree in Theoretical Physics from the University of Illinois at Urbana-Champaign. He then held a series of postdoctoral and temporary faculty positions during which time he did research on the theory & phenomenology of elementary particles. In 1983 he joined what is now the National Institute of Standards and Technology (NIST), where he began working on antenna metrology and EMC. Around 1995 he switched to thermal noise metrology, where he worked on noise-temperature calibration techniques, amplifier and transistor noise-parameter measurements methods, standards for microwave remote sensing, and measurement uncertainty analysis. Since his retirement in 2008, he has continued to work on topics in noise on a part-time basis, as a contactor and/or a guest researcher. From 2001 to 2013, he chaired the RF working group of the Consultative Committee on Electricity & Magnetism (CCEM) of the International Committee on Weights and Measures (CIPM). He has received a best paper award from IEEE Trans. EMC, three Dept. of Commerce medals, and a career award from ARFTG.