

# The School of Electrical and Computer Engineering DISTINGUISHED SEMINAR SERIES 2016

The Distinguished Seminar Series of the School of Electrical and Computer Engineering (ECE) presents the work of internationally recognized researchers. This seminar series is intended to provide an open platform for the faculty and students, to have a dialog with leading researchers in various fields of ECE, and to build-up a dynamic and vibrant culture of research and academic exchange in the ECE department. All seminars are free and open to the public.



**Present and Future Challenges of Data Storage Channels**  
12:30 - 1:30 p.m. Wednesday, November 16 | ATRC 102

**Dr. J.R. Cruz** - Director and Tilley Chair Professor, School of Electrical and Computer Engineering, University of Oklahoma

J. R. Cruz (S'75-M'79-SM'85-F'01) received his undergraduate degree in electrical engineering from the University of Porto, Portugal, and the M.S. and Ph.D. degrees from the University of Houston, TX, USA, while holding a Fulbright Fellowship. He was with Computer Sciences Corporation at the NASA Johnson Space Center, and Motorola Research, prior to joining The University of Oklahoma, where he is currently a Professor, Director of the School of Electrical and Computer Engineering, and the holder of the Tilley Chair in Electrical Engineering. His research interests are in communications signal processing, particularly equalization, detection and coding

techniques, with applications to digital data storage and transmission. He is a member of the Board of Governors and a Past President of the IEEE Vehicular Technology Society, and a recipient of its Outstanding Service and Stuart Meyer Memorial Awards. He is a former Editor-in-Chief of the IEEE Transactions on Vehicular Technology and currently serves as an Editor for the IEEE Transactions on Magnetics. He is a Fellow of the Radio Club of America, the recipient of the Armstrong Medal in 2014 and the IEEE Third-Millennium Medal in 2000. He was a Distinguished Lecturer for the IEEE Communications Society and the co-recipient of the Best Paper Prize in Signal Processing and Coding for Data Storage at the 2007 IEEE International Conference on Communications.

## Seminar Abstract

Data storage plays a large role in our lives and drives an industry with annual sales approaching \$30B. To be useful, data storage devices must be able to reliably read back the same data that was originally written. However, the underlying communication channels in these systems are inherently unreliable, often very unreliable, and behave in complex ways unlike simpler communications channels often found in transmission systems. Understanding the behavior of these complex channels is necessary in order to design reliable data storage systems that can overcome these challenges. In this lecture, we first discuss the magnetic recording channel for high-density hard-disk drives and our development of a state-the-art channel model. We also discuss NAND-flash solid-state drive channels as well as future non-volatile memories such as spin-torque transfer random access memory (STT-RAM), and explore how all these channels pose special problems for reliable storage system design.

**Food provided at 12 P.M. - 12:30 P.M.**

**Food reservation can be made at the ES202 front desk one week prior to each seminar.**



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