Monday, 6 June 2011 **8:00 AM - 12:00 PM**

SC-4: Low Phase Noise Oscillators: Theory and Design

Instructor: Jeremy Everard, University of York

Topics:

- Feedback and negative resistance oscillator phase noise theory
- Optimum operating conditions
- Flicker noise effects: modeling, measurement and reduction
- Oscillator tuning and its effect on phase noise
- Generic design rules for low noise oscillators
- Oscillator designs: LC, crystal, helical, coplanar, SAW, CRO, DRO
- Phase noise measurements: phase detector, cross correlation and direct digital measurement

This half-day course will present the theory, underlying principles, and latest techniques for the design of state-of-the-art low-noise oscillators. Detailed design discussions will cover oscillators with exceptional performance operating from 10MHz to 10GHz using using a variety of different resonators: LC, crystal, SAW, helical, printed-helical, coplanar, ceramic transmission line (CRO), and dielectric (DRO). Material new to this year's course includes simplified accurate phase noise theory for negative resistance oscillators and a longer description of measurement systems and a cross correlation system with a noise floor below -200dBc. Students will be provided with a copy of the presentation and a disk containing the specific complete software required for simulation of the resonator (including parasitics) and simulation of phase noise. Students of the course will be eligible for a significant discount from Wiley on the purchase of Prof. Everard's book "Fundamentals of RF Circuit Design: with Low Noise Oscillators," on which much of this course is based.

Jeremy K. A. Everard obtained his PhD from the University of Cambridge in 1983 and currently holds the BAE Systems/Royal Academy of Engineering Research Professorship in Low Phase Noise Signal Generation at the University of York. He has been designing low noise oscillators for over 30 year at Marconi Research Laboratories, Philips Research, MA-COM, the Universities of London and York. His group has now developed a number of oscillator designs offering some of the best performance available in the world. For example: 10MHz SC cut crystal oscillators with -123dBc/Hz at 1Hz and -149dBc/Hz at 10Hz and L-band (1.25GHz) DR oscillators with -173dBc/Hz at 10kHz, -180dbc/Hz at 50kHz offset and a noise floor below -186dBc/Hz.