

IEEE PES PowerAfrica 2017  
Tutorial Sessions, Day 3, Friday 30<sup>th</sup> June 2017



1PM-5PM\_TU-2A: Teaching Critical Engineering Thinking Skills

**\*\*Registration for faculty & instructors from African Universities: 30 USD  
Sponsored by the IEEE TAB Ad Hoc Committee on Africa\*\***

Objectives:

In a “train-the-trainers” approach, this tutorial uses the design of a micro-hydro generator system to engage engineering faculty in thinking about how Critical Engineering Thinking Skills (CETS) can be taught to engineering students. This application has been selected for its relevance to Africa and the ease with which the engineering problem can be conveyed to faculty from all areas of engineering. Participants will first discuss a rote approach to solving this problem, illustrating how students are often shown a cookbook approach to engineering that does not engage them in CETS. Using the micro-hydro generation system example, the faculty participants will develop together an approach to teaching students that involves them in a much more realistic design experience that requires CETS. As there is no cookbook way to incorporate CETS into engineering education, the faculty participants will identify topics they teach regularly and work through a process of incorporating CETS that builds on the experience they have had with the micro-hydro generation example.

Instructor:



Prof Bruce Krogh is Professor of Electrical and Computer Engineering at Carnegie Mellon University in Pittsburgh, Pennsylvania, USA. In 2012, he moved to Kigali, Rwanda, as the founding director of Carnegie Mellon University Africa, where full-time resident faculty offer master's degrees in information technology (MIST) and electrical and computer engineering (MS ECE). He has contributed for over thirty years to the theory and application of embedded control systems in a number of areas, including power systems, robotics, manufacturing systems, automobiles, and aircraft. Prior to joining Carnegie Mellon University, he was a systems engineer at the Energy Systems Division of Westinghouse Corporation where he developed control software for electric utility energy control centers. He has served on editorial boards of several journals and was founding Editor-in-Chief of the IEEE Transactions on Control Systems Technology. He is a Fellow of the IEEE and a Distinguished Member of the IEEE Control Systems Society. His current research interests include new operating and business strategies for ICT-enabled microgrids in emerging markets.