

**PHD COURSE:**

# Applications of Computational Intelligence to Enable Renewable Energy

**Speaker: Dr. Sue Ellen Haupt***(Research Application Laboratory, NCAR, USA)***Date:** 09-10-11-12-13 May 2016**Location:** Room GARDA – Polo Scientifico F. Ferrari – Povo**Duration:** 20 Hours**Note:** The seminar will be held in English**Contact:** Dr. Federico Viani ([federico.viani@unitn.it](mailto:federico.viani@unitn.it))

To blend growing amounts of power from the variable renewable resources into utility operations requires accurate forecasts. For both day ahead planning and real-time operations, the power from the wind and solar resources must be predicted based on real-time observations and a series of models that span the temporal and spatial scales of the problem, using the physical and dynamical knowledge as well as computational intelligence. Accurate prediction is a Big Data problem that requires disparate data, multiple models that are each applicable for a specific time frame, and application of computational intelligence techniques to successfully blend all of the model and observational information in real-time and deliver it to the decision-makers at utilities and grid operators. This course will review the types of forecasting available and how they can be blended to meet the growing needs of utilities. We will consider both solar power forecasting and wind power forecasts, but will also discuss the additional impact on electric load and the need to balance energy supply with demand under large scale renewable deployment.

**• About the Speaker**

**Dr. Sue Ellen Haupt** is Director of the Weather Systems and Assessment Program of the Research Applications Laboratory of NCAR. She previously headed the Department of Atmospheric and Oceanic Physics at the Applied Research Laboratory of The Pennsylvania State University where she remains an Adjunct Professor of Meteorology. She earned her Ph.D. in Atmospheric Science from the University of Michigan (1988), M.S. in Mechanical Engineering from Worcester Polytechnic Institute (1984), M.S. in Engineering Management from Western New England College (1982), B.S. in Meteorology from Penn State (1978), and did a postdoctoral fellowship with the Advanced Study Program of NCAR. She has also been on the faculty of the University of Colorado/Boulder; the U.S. Air Force Academy (visiting); University of Nevada, Reno; and Utah State University and previously worked for the New England Electric System and GCA Corporation.

Dr. Haupt is an expert in renewable energy, boundary layer meteorology, large scale atmospheric dynamics, dynamical systems, numerical methods, artificial intelligence methods, and computational fluid dynamics. Her specialty is in applying novel numerical techniques to problems in the environmental sciences in both basic and applied research. She enjoys teaching and mentoring graduate students as well as developing and directing research programs and projects.

Dr. Haupt recently chaired the Committee on Artificial Intelligence Applications to Environmental Science of the American Meteorological Society, and teaches the portions of short courses offered by that committee on using genetic algorithms for environmental science problems. She currently serves on the AMS Board on Economic and Enterprise Development. She is also a member of the American Geophysical Union, Society of Women Engineers (served as faculty advisor for student groups for five years), American Society of Engineering Education, Chi Epsilon Pi, and Phi Mu Epsilon. She co-authored *Practical Genetic Algorithms* (Wiley and Sons 1998, second edition 2004, Arabic edition 2011); is primary editor for *Applications of Artificial Intelligence Methods in the Environmental Sciences* (Springer, 2009); is currently co-editing *Weather Matters for Energy*; and has authored over 250 book chapters, journal articles, conference papers, and technical reports.