François Hemez is a scientist at Lawrence Livermore National Laboratory (LLNL) where he contributes to assessments of the U.S. nuclear deterrent and supports non-proliferation efforts of the Intelligence Community. Before joining LLNL, he was adjunct professor at the University of California San Diego (Structural Engineering Department) and spent twenty-one years at Los Alamos National Laboratory with responsibilities in various programs for computational engineering and physics. François graduated from Ecole Centrale Paris, France in 1989 and earned a doctoral degree in aerospace engineering from the University of Colorado Boulder in 1993. François is recognized for his expertise in model verification and validation, uncertainty quantification and decision-making. Since 2001, he has authored 430+ technical reports, peer-reviewed manuscripts and book chapters; given 162 invited lectures, including 9 international keynotes; and taught short-courses to 938 graduate students and practicing engineers around the World.

Numerical models and simulations increasingly support decision-making for high-consequence national security applications. Examples include predicting the trajectories of hurricanes, anticipating the consequences of terrorist threats and managing infrastructure dependencies in urban environments. This presentation overviews a few aspects of the U.S. Department of Energy’s simulation program whose main goal is to develop the computing platforms and software necessary to credibly establish the safety, reliability and performance of the U.S. nuclear deterrent in the absence of full-scale testing. These resources are also applied to other national security problems such as evaluating the impacts of shifting climate patterns, understanding novel viruses at the molecular level, or assessing the proliferation of nuclear materials and technologies. Attempting to forecast the future or predict conditions that cannot be observed experimentally also raises into question the veracity of numerical models and the quantification of prediction uncertainty. The discussion is illustrated with examples such as the training of emergency personnel to respond to large-scale incidents in urban environments or the interpretation of activity patterns through remote sensing and data analytics.

Monday, March 1, 2021
9:00 am – 10:00 am  Presentation: Scientific Computing for National Security

12:00 pm-1:00 pm  Meeting with Students:
https://psu.zoom.us/j/92836428789?pwd=VTQvaUxXV3BKV3VjVXVpNGxNc0RoZz09
Password: 315167