IOWA STATE UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING

Design of emerging engineered materials system

Wei Chen
Northwestern University

Tuesday, October 28, 11:00-11:50 a.m.
2004 Black

Abstract:
Design of material systems with complex microstructures represents the future of materials development to achieve unprecedented product performance. While most of the existing methods are trial-and-error based, we are proposing systematic computational design methods that provide a seamless integration of design optimization, predictive materials modeling, processing/manufacturing, and data/informatics to enable the accelerated design and development of advanced materials systems. In this talk, we will first introduce a descriptor-based methodology for designing heterogeneous microstructural materials systems such as polymer nanocomposites and nanodielectric polymers. We will then introduce the use of robust topology optimization for designing emerging energy harvesting metamaterial structures such as thin-film solar cells and high-performance transparent solar cell structure considering natural sunlight illumination. Challenges and opportunities in this new research field will be discussed.

Biography:
Dr. Wei Chen is the Wilson-Cook Chair Professor in Engineering Design at Northwestern University. She is a Professor in the Department of Mechanical Engineering, with courtesy appointment in the Department of Industrial Engineering and Management. Directing the Integrated DEsign Automation Laboratory (IDEAL- http://ideal.mech.northwestern.edu/), her current research involves issues such as simulation-based design under uncertainty, model validation, stochastic multiscale analysis and design, robust shape and topology optimization, multidisciplinary optimization, consumer choice modeling and enterprise-driven decision-based design. She is the co-founder and Director of the interdisciplinary doctoral cluster in Predictive Science and Engineering Design (PSED) at Northwestern. She is also serving as the Chair of the research faculty council of the Segal Design Institution at Northwestern.

Dr. Chen received her Ph.D. from the Georgia Institute of Technology in 1995. She is the Past Chair of the ASME Design Engineering Division (DED) Executive Committee and was an elected Advisory Board member of the Design Society (2007-2013). She is a review editor of Structural and Multidisciplinary Optimization and served twice as an Associate Editor of the ASME Journal of Mechanical Design. Dr. Chen was the recipient of the 1996 NSF Faculty Early Career Award, the 1998 American Society of Mechanical Engineers (ASME) Pi Tau Sigma Gold Medal achievement award, and the 2006 SAE Ralph R. Teetor Educational award. She is a Fellow of American Society of Mechanical Engineers (ASME) and an Associate Fellow of American Institute of Aeronautics and Astronautics (AIAA).