PURDUE UNIVERSITY | Environmental and Ecological Engineering
COLLEGE OF ENGINEERING

EEE Research Seminar
Date: Feb 25 at 10:30 AM
Location: POTR 234 (Fu Room)

Timothy G. Gutowski
Professor of Mechanical Engineering
Massachusetts Institute of Technology

Research Across Scales; Connecting Engineering to the Grand Challenges

Abstract
The United Nations has identified 17 Sustainable Development Goals, the U. S. National Science Foundation is developing 33 Big Ideas, and every day we hear more about Sustainability and Climate Change. All around us big problems and big opportunities are being identified and engineers and other professional groups are scrambling to help, but how?

Generally speaking, many of these Grand Challenges, especially those related to sustainability at global scales, are outside the scope of our usual operating space. Some of these challenges are even expressed as "existential threats" to humanity that will require a significant transformation of society. This is not business as usual.

In this talk, I will try to structure the issues related to engineering that address the Grand Challenges (specifically climate change) in a way that makes the problem accessible and identifies major new developmental themes for multidisciplinary engineering research and education. Through illustrations, I will address 4 major subtopics; 1) human behavior, 2) interconnectedness, 3) scale, complexity and partitioning, and 4) the changing role of technology.

Engineers are problem solvers and can make significant contributions to addressing the Grand Challenges. A good first step is to become aware of the actual large scale consequences of engineering actions through multidisciplinary preparation. This is the essential focus of this talk.

Bio
Timothy Gutowski is from Chicago Illinois. He attended college in Wisconsin (B.S. Mathematics, 1967), Illinois (M.S. Theoretical and Applied Mechanics, 1968) and Massachusetts (MIT, PhD Mechanical Engineering, 1981). He has worked at Wiss, Janney, and Elstner (structural engineer) and Bolt, Berank and Newman (noise and acoustics consultant) and has taught mechanical engineering at the Escuela Politécnica Nacional in Quito, Ecuador, while he was in the Peace Corps.

He is currently a Professor of Mechanical Engineering at the Massachusetts Institute of Technology, where he has been on the faculty since 1981. From 1994 to 2004 he was the director of the Laboratory for Manufacturing and Productivity at M.I.T., and from 2001 to 2005 he was the associate head of the Department of Mechanical Engineering there. From 1999 to 2001 he served as the chairman of the DOE/NSF international panel on Environmentally Benign Manufacturing. His research interests have ranged from polymer processing, to advanced composites manufacturing, to manufacturing systems design, to his current area of study - manufacturing and the environment.

He has over 150 technical publications, three books, and seven patents and patent applications. His most recent books are: ***Thermodynamics and the Destruction of Resources,*** (with Bhavik Bakshi and Dušan Sekulić) Cambridge University Press 2011, and ***Advanced Composites Manufacturing***, Wiley 1997. And in 1972 he wrote ***Conceptos Básicos de la Teoría de Vibraciones.***

His current area of study is focused on the climate change consequences and mitigation strategies for engineered systems including; manufacturing, transportation, buildings and energy systems.