The Humboldt State University Department of Mathematics
Proudly Presents:

The 54th Harry S. Kieval Lecture**

Kenneth Golden
University of Utah

"Climate Change and the Mathematics of Sea Ice"

Sea ice is both an indicator and agent of climate change. It also hosts extensive algal and bacterial communities which sustain life in the polar oceans. The dramatic decline of the summer Arctic ice pack is perhaps the most visible, large scale change on Earth's surface in recent years. Most global climate models, however, have underestimated this decline, while the Antarctic sea ice pack has increased. We will discuss some key sea ice processes which must be better represented in climate models, such as snow-ice formation and the evolution of melt ponds and ice pack reflectance. Recent advances in characterizing the porous microstructure of sea ice, and fluid flow through it, shed new light on these processes. Our work will help in predicting how global warming may affect sea ice, and the response of polar ecosystems. Video from a 2007 Antarctic expedition where we measured fluid and electrical transport in sea ice will be shown.

Thursday, December 3, 2009
7:30 P.M.
Kate Buchanan Room
University Center

A lecture on some popular and/or broad aspects of mathematics attractive to undergraduates and the public
For More Information go to: http://www.humboldt.edu/~mathdept/HarrySKieval/kl.html

HSU is an AA/EO institution.
Disability accommodations may be available from event sponsor at 826-5347

Kenneth Golden
University of Utah

"Thermal Evolution of Fluid Permeability and Microstructure in Sea Ice"

Fluid flow through porous sea ice mediates a broad range of geophsyical and biological processes such as snow-ice formation, the evolution of ice pack albedo, and nutrient replenishment for microbial communities living in brine inclusions. We will describe recent advances in using percolation, hierarchical, and network models to predict the fluid permeability of sea ice, and rigorous diffusion-based methods for bounding such transport coefficients. We'll also discuss X-ray CT imaging of the brine microstructure and connectivity analysis of random graphs derived from the tomographic images. Our work will help in predicting how global warming may affect Earth's sea ice packs and how polar ecosystems may respond. Related results on electromagnetic properties will help in monitoring ice thickness and the impact of climate change on the polar marine environment.

Thursday, December 3, 2009
4:00 P.M. BSS 166

Pre-Colloquium Tea BSS
3rd Floor Open Alcove Area 3:30 P.M.

Kenneth M. Golden is a Professor of Mathematics and Adjunct Professor of Bioengineering at the University of Utah. His scientific interests lie in composite materials, sea ice, climate change, phase transitions, and inverse problems. He has published 49 papers in mathematics, physics, geophysics, electrical engineering and mechanical engineering journals, and given over 250 invited lectures on six continents, including two presentations in the US Congress. Dr. Golden has journeyed on five Antarctic and five Arctic expeditions to study sea ice. In high school he became fascinated by the polar regions, studying satellite images of sea ice at NASA/Goddard Space Flight Center. As an undergraduate he worked at the US Army Cold Regions Research and Engineering Laboratory on radar propagation in sea ice, while completing degrees in Mathematics and Physics at Dartmouth College. Dr. Golden received his Ph.D. in Mathematics at the Courant Institute of NYU in 1984. Prior to moving to Utah in 1991, he was an Assistant Professor of Mathematics at Princeton University, and a National Science Foundation Postdoctoral Fellow at Rutgers University in mathematical physics. Professor Golden has received teaching awards from Princeton and the University of Utah. His research has been featured in newspaper, magazine, and web articles, including a profile in *Science* in April 2009, and he has been interviewed on both radio and television.
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