

Speaker: Dan Nordman, Iowa State University (joint work with Melissa Bingham and Steve Vardeman)

Title: Modeling 3-Dimensional Rotations With Applications to Measured Crystal Orientations

Date: **Tuesday, June 23**

Time: **2:30 p.m.**

Location: **TA 3, Building 40, Room N125 (Moon Room)**

Abstract:

The talk describes a problem in formulating probability models for random  $3 \times 3$  rotation matrices. Data points in the form of rotation matrices arise in studies of human **kinematics** and are also an output of Electron Backscatter Diffraction (EBSD), which is a technique used in materials science to examine the microtexture of metals. A direct modeling approach for 3-D rotation matrices is proposed beginning from a simple, intuitively appealing mechanism for generating random orientations. However, the modeling technique can also produce probability densities for rotation matrices which have singularities, making usual likelihood inference impossible. Both (quasi-)likelihood and Bayes forms of inference on 3-D random orientations are described and investigated in simulation. These are also applied to quantifying the precision of EBSD readings.