1154-55-1564 **Audun Myers**, **Elizabeth Munch** and **Firas A Khasawneh*** (khasawn3@egr.msu.edu), Department of Mechanical Engineering, 428 S. Shaw Lane, Rm 2503, East Lansing, MI 48824.

Topological Data Analysis for Detecting Dynamic State Changes via Nodal Networks.

In this talk, we explore topological measures for identifying the state of a dynamic system by examining its time series. Specifically, we investigate embedding time series into a graph via two different methods: 1) Using Takens embedding and then mapping the embedded points into a network by connecting each node to its k-nearest neighbors, and 2) constructing ordinal networks by running a window of size n over the time series. The latter converts the time-indexed time series into an integer-indexed sequence of symbols or motifs. We study the resulting network using scores derived from their persistence diagrams, which are constructions from Topological Data Analysis (TDA). We apply our approach to several examples, show the results for both types of embeddings using novel TDA-based scores, and compare the resulting scores to existing methods which utilize graph-based scores. (Received September 16, 2019)