WRIGHT STATE UNIVERSITY | DEPARTMENT OF MATHEMATICS AND STATISTICS

COLLOQUIUM

Speaker: **Dr. Ryan Kramer, AFRL**

Title: **Topological Data Analysis for Explainable Artificial Intelligent Approaches**

Date: **Friday, April 6, 2018**

Room/Time:

Meet-n-Greet:	**2:30 p.m.**	**Room 222 MM**
Talk:	**3:00 p.m.**	**Room 224 MM**

ABSTRACT:

Breakthrough advances in the sciences and engineering have enabled the collection of high resolution data en masse. This rapid and large data collection makes it difficult or impossible to exploit using currently available analytic methods. In this work, we propose to develop a completely novel Explainable Artificial Intelligence (XAI) approach that has the potential to match current data production and provide enhanced data exploitation. By structuring data in a continuously available framework using Topological Data Analysis (TDA), we can precisely locate relevant information, autonomously look for hidden correlations and non-hypothesized understanding, all while simultaneously surveilling the framework with statistical rigor. Data is presented in human consumable visualizations, and future data collections can be registered and analytically fused with previously created frameworks. This approach allows for dynamic modeling that is essential for understanding quickly changing environments. Multiple use cases will be discussed that include: methodological development for unsupervised and supervised image classification, feature extraction using TDA decomposition, and personalized analytics for physiological monitoring. The target for this effort are specific researchers or analysts who require comprehensive understanding of dynamic processes and highly complex datasets where integration of artificial intelligence (AI) would derive significant benefit.

SPEAKER BIO:

With over 15 years of federal service, Dr. Ryan Kramer has had a diversified career path as an Air Force enlisted member, officer, and civil servant. Throughout Ryan's career, he has been involved in numerous efforts aimed at advancing revolutionary research concepts to address AF and DoD needs. Ryan has extensive scientific expertise that spans novel sensor development for performance monitoring, human health and performance data analytics, biomaterial research, and exploiting molecular genetics for disease monitoring and susceptibility analysis. Dr. Kramer finished his PhD at the University of Cincinnati in 2014 in the field of Molecular Genetics and Bioinformatics where he focused on molecular signatures of disease across recombinant inbred mouse populations, high-content/high-throughput host-directed therapeutic discovery, and machine learning integration for prognostic feature learning and classification. His current research focuses on developing Explainable Artificial Intelligent (XAI) data analytics approaches using Topological Data Analysis that generalize across multiple use cases and operational scenarios.