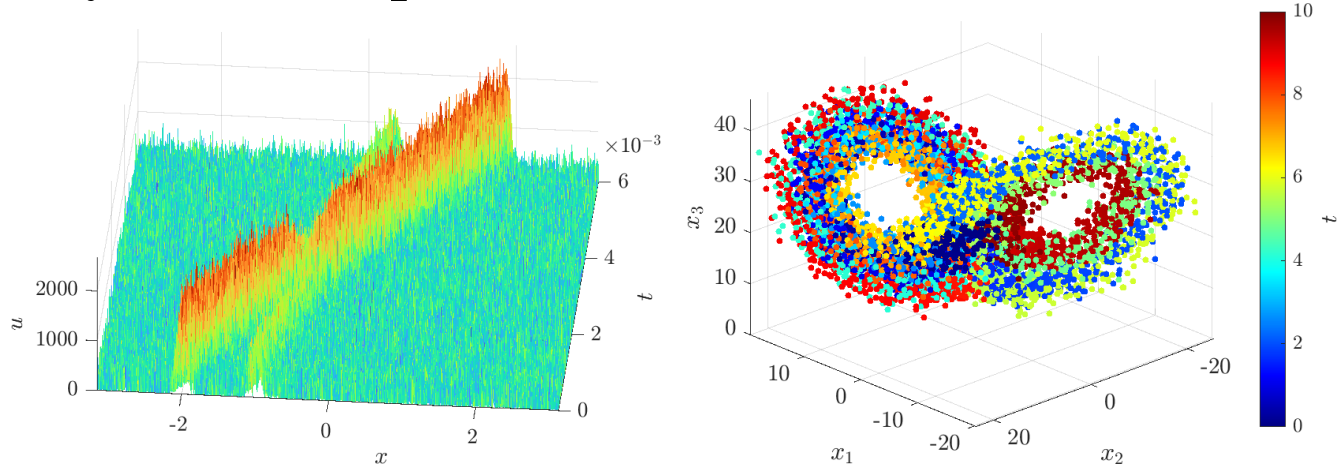


Q: What equations are behind this data?



A: Answers in APPM/STAT 4720/5720-020

Data-Driven Modeling

Instructor: David Bortz

Spring 2026: MWF 9:05-9:55 Kitt Central N100-101

Data-driven discovery methods are revolutionizing the modeling, prediction, and control of complex systems.

These methods reveal governing equations *directly from data* and their use in the last 6 years has exploded. The class will illustrate methods to integrate modeling and control of dynamical systems with modern methods in data science, machine learning, and computational and applied mathematics. It will also highlight many of the recent advances in scientific computing that enable data-driven methods to be applied to a diverse range of complex systems, such as cell migration, turbulence, the brain, climate, epidemiology, robotics, and autonomy.

Goal The central goal for this class is for students to develop a fundamental understanding of (and how to apply) modern data-driven modeling methods including: Sparse Identification of Nonlinear Dynamics, Dynamic Mode Decomposition, Koopman Operators, etc.

Guest Lecturers We will be having several virtual lectures from leading research groups around the world.

Audience This class is designed for STEM grad students at all levels and advanced undergrads.

Prerequisites Numerical Methods (APPM 4600 or equivalent) or permission of the instructor. Students are expected to have familiarity with basic statistics and proficiency with MATLAB, python, R, julia, or other modern computational language.

Textbook *Data-Driven Science and Engineering: Machine Learning, Dynamical Systems, and Control*, Steven L. Brunton and J. Nathan Kutz, Cambridge University Press (2nd ed.), 2022. This book will be heavily supplemented by current literature.