COLLEGE OF ENGINEERING

# Research Seminar Series

University of Nebraska-Lincoln
Department of Chemical and Biomolecular Engineering

# Applying constraint-based modeling and adaptive laboratory evolution to bioengineering


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## Friday, November 17

4:00 p.m. – 5:00 p.m. Othmer Hall, Room 106

**Refreshments provided*

## Abstract


The principles of Chemical Engineering can be applied to biological systems using constraint-based reconstruction and analysis (COBRA). This powerful modelling technique built on the concept of performing mass and energy balances around a biological system (e.g., a cell) has many bioengineering applications such as designing strains for bioprocessing and discovery of unknown gene functions. Several successful cases studies using COBRA will be presented. Adaptive laboratory evolution (ALE) is also a powerful technology for developing both bioprocessing strains and for discovery. To leverage the utility of high-throughput sequencing after ALE, sophisticated experimentation is necessary to perform controlled ALE experiments for the goal of understanding the range of phenotypes available and how they arise. The presented work will describe an automated technology built for performing ALE experiments and its application towards highlighted use cases. These ALE use cases include adapting strains to higher tolerance of a desired compound, adaptation to utilize non-natural substrates, and adaptation to variable bioprocessing conditions.


## Speaker Bio

Adam Feist earned a B.S. in Chemical Engineering from the University of Nebraska – Lincoln in 2003 and is currently a Project Scientist at UCSD and a Senior Scientist at the Center for Biosustainability at the Technical University of Denmark. He has a PhD in Bioengineering from the University of California – San Diego. Adam has 2 years of experience in industry working at a start-up company focused on commercializing constraint-based modeling in the field of human health. His research expertise is in the technologies of constraint-based reconstruction and modeling and adaptive laboratory evolution and has focused his current research towards the fields of metabolic engineering and discovery of unknown content in *E. coli*. Adam has co-authored over 50 peer-reviewed publications in these fields. He has served as a research advisor for numerous PhD students. He is a member of a number of professional engineering societies, serves as a peer-reviewer for numerous journals, and serves as a guest lecturer.