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Microbiomes Cluster Seminar Series Presents

# "Engineering Functional Primitives of Microbial Interactions to Mediate Community Dynamics"

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Dr. Egbert is a project scientist at Lawrence Berkeley National Laboratory's Environmental Genomics and Systems Biology Division. He is developing an engineering platform to assemble and evaluate pooled genomic mutant libraries to optimize dynamic and biosynthetic gene circuits in bacteria. Dr. Egbert received a Ph.D. from the University of Washington Department of Electrical Engineering where he developed a genetic strategy to explore and optimize gene circuits in bacteria, including a developmental program implementing self-destructive altruistic behavior to utilize the complex feedstock cellulose. Prior to completing his doctorate, he received bachelor's degrees in Electrical Engineering and Korean from Brigham Young University .

**ABSTRACT**

Advances in genome engineering and high-throughput DNA sequencing and synthesis have driven the development of complex engineered behaviors in microbes to meet pressing challenges in bioprocessing, agriculture and medicine. Selection from a growing collection of microbial hosts for high-throughput library engineering of genetic circuits and biosynthetic gene clusters holds promise to deepen our understanding of microbial interactions in complex, variable environments and expand our ability to manipulate them.

This talk will present research directed to reliably program behaviors that control cell fate or community interactions through self-destructive altruism or antimicrobial production in Escherichia coli with a focus on model-guided balancing of engineered function against population fitness. Approaches to efficiently search multi-dimensional gene expression space for dynamic and biosynthetic circuits will be highlighted. Engineering evolutionarily robust developmental circuits could act as a foundation for biological control systems that mediate microbial interactions in environments ranging from large-scale bioreactors to the plant phyllosphere to the animal gut.

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Videoconferenced to: 5004 Marsico (UNC Chapel Hill)
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