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The HOWARD P. ISERMANN
DEPARTMENT OF CHEMICAL AND
BIOLOGICAL ENGINEERING

CBE Seminar Series – Spring 2025

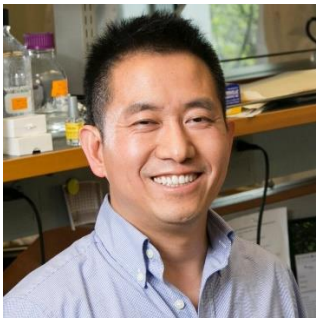
Dr. Lingchong You

James L. Meriam Distinguished Professor
Department of Biomedical Engineering
Duke University

Seminar: Wednesday, March 12, 2025
9:30 a.m. (Ricketts 211)

"Emerging Simplicity in Microbiome Dynamics"

Abstract: Predictive control of microbial communities presents a daunting challenge, due to numerous interactions among community members, mobile genetic elements, and environmental influences. However, our computational and experimental analysis has uncovered an emerging simplicity beneath this complexity. In this talk, I will share how we have used machine learning to reveal hidden simplicity in microbial dynamics, uncovering low-dimensional representations that capture the essential behaviors of these systems. In parallel, we have developed coarse-grained models that attempt to describe these dynamics in a simplified yet effective manner. Moreover, I will discuss horizontal gene transfer (HGT) as nature's approach to coarse-graining—enabling the stabilization and predictability of functional dynamics within microbial communities without needing to fully capture their compositional dynamics. Together, these perspectives suggest the possibility of scalable and precise microbiome engineering for applications in medicine and biotechnology.



Biography: Lingchong You is a James L. Meriam Distinguished Professor of Biomedical Engineering at Duke University and the founding Director of the Center for Quantiative Biodesign (biodesign.duke.edu). The You lab (youlab.bio) uses a combination of mathematical modeling, machine learning, and quantitative experiments to elucidate principles underlying the dynamics of microbial communities for applications in computation, engineering, and medicine. Dr. You is a David and Lucile Packard Fellow (2006), a Dupont Young Professor (2008), an NSF Career Awardee (2010), and a fellow of the American Institute for Medical and Biomedical Engineering (2019). He currently serves on the editorial boards of several journals, including Molecular Systems Biology, PLoS Computational Biology, and Quantitative Biology.

Refreshments will be available at 9:00 a.m. in the Ricketts Coonley Lounge.