



Environmental Engineering & Sciences

Department of Civil and Environmental Engineering

CEE 595EWS Seminar

Monday, April 22, 2024 | 12:00 – 12:50 p.m. CST | 1310 Yeh Center

Modeling Nitrogen Fixation in Soybean Nodules to Improve Soil and Environmental Health

Soybean plants form symbiotic relationships with *Bradyrhizobia* bacteria, where the plant supplies carbon to the bacteria in exchange for nitrogen. There is a lot of interest around understanding this relationship to improve plant growth and decrease the need for fertilizers. To understand more about this exchange of carbon and nitrogen, we are developing a kinetic model of key metabolic reactions in soybean nodules. We are also exploring additional parameter estimation approaches, including machine learning algorithms that predict kinetic parameters from protein sequences and global optimization algorithms to fit against experimental data, to calibrate our model to soybean nodules. Once developed, this model will provide insight into potential bottlenecks that could be engineered to improve nitrogen fixation efficiency. This presentation will provide a comprehensive overview of the nitrogen fixation process in soybean nodules, illustrate the associated metabolic and kinetic models, and discuss the challenges and limitations currently facing this area of research.

Rourou Ji
PhD Candidate (Advisor Megan Matthews)



Biography

Rourou is a 2nd-year Ph.D. student in Dr. Megan Matthews' research group. She earned her Bachelor's degree in Civil Engineering from Auburn University and her Master's degree in Environmental Health and Engineering from Johns Hopkins University. Her research focuses on developing a kinetic model to analyze soybean nodule metabolism, with the goal of enhancing nitrogen fixation and offering strategies for the bioengineering of plants to adapt to climate change. Beyond her academic pursuits, Rourou enjoys playing tennis, working out, hiking, and spending time with her tuxedo cat.