

# Biology Seminar



12:30 - 1:30 pm  
Friday, November 28, 2025  
BGS 0165



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## **Patterns of life: Quantifying biological symmetry across scales**

Symmetry is a fundamental characteristic of natural systems, and is often linked to survival, reproductive success, and evolvability. While symmetry is often intuitively obvious, biological symmetry is rarely perfect, making it challenging to define and compare quantitative measures, particularly across different systems. This lack of a common framework limits our ability to compare datasets, identify organizing principles, and standardize analyses across scales. To address this, we developed a flexible, entropy-based approach for quantifying symmetry we termed "Transformation Information" (TI). TI requires minimal user input and can be applied consistently across diverse biological structures and datasets. I will demonstrate its use in diverse contexts, including detecting convergent evolution in flowering plants, classifying biopolymer networks, and visualizing symmetry transitions during pattern formation, to illustrate how quantitative measures of symmetry can reveal underlying organizing principles in complex biological systems.

