QUANTITATIVE AND SYSTEMS BIOLOGY COLLOQUIUM:
Understanding the impact of disturbances on ecosystems via data-driven theory

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Date:
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Time:
12:30 – 1:45 PM

Location:
GRAN 135

About The Speaker:

Lucas Medeiros is a Postdoctoral Scholar at UC Santa Cruz and NOAA Fisheries working on data-driven theoretical approaches to understand, forecast, and manage the population dynamics of marine species. Lucas obtained a PhD degree in Civil and Environmental Engineering from MIT, where he combined model-driven and data-driven theoretical approaches with empirical data to understand how communities of interacting species respond to perturbations. Lucas is originally from Brazil and obtained a Master's degree in Ecology and Bachelor's degrees in Biology and Applied Mathematics from the University of São Paulo.

Abstract:

Virtually all ecosystems on Earth face perturbations (e.g., warming, fires, storms, pollution, harvesting), some of which are becoming stronger and more frequent due to global change. Yet, understanding and predicting the impact of such disturbances on natural ecosystems containing multiple species using parameterized dynamical models has been a notoriously difficult task in ecology. In this talk, I will present two projects that use an alternative theoretical approach to understand the impact of disturbances on ecosystems: extracting information about population dynamics directly from empirical time series by making minimal assumptions. The first project addresses how to detect which species in an ecosystem are the most sensitive to pulse perturbations on abundances at a given moment in time. The second project investigates how to determine optimum harvest rates that lead to a high abundance and high yield for an exploited species. For each project, I will introduce our data-driven theoretical approach and then show an application using empirical data from the marine environment. Overall, this research illustrates a tight and powerful integration of theory and data that may allow us to anticipate the responses of natural ecosystems to future disturbances.

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