Ben-Gurion University of the Negev
Blaustein Institutes for Desert Research
The Swiss Institute for Dryland Environmental and Energy Research
Alexandre Yersin Department of Solar Energy and Environmental Physics

Title:

Mathematical models in population genetics

Speaker:

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Abstract:

Evolution is a complex process, ultimately driven by changes in allele frequencies in populations. In Population Genetics, the field in which these evolutionary dynamics are studied, mathematical modeling plays a prominent role. Mathematical models, incorporating various evolutionary forces – such as selection, mutation, gene flow, and genetic drift – are used to gain a better understanding of evolution. In this talk, I will address some of these modeling efforts. First, I will present the way in which the stochastic element of the evolutionary process, genetic drift, has been modeled as a diffusion process, and how we can use an alternative discrete modeling framework to improve its approximations. Second, I will provide an overview of population structure modeling – subdivided populations, in which subpopulations exchange genes under certain structural configurations. I will highlight the limitation of these models and show how mathematical topology can help us clarify and classify the roles of different models. Lastly, I will present a network theory approach for looking at population structure, which can help us describe and analyze more realistic models, addressing the structural complexity most often observed in natural systems.

Tuesday, March 28, 2017, 11:00
Lecture room, Physics Building (ground floor)