Mini-course on first-passage percolation
IMPA, from 11/10 to 11/14, 2014

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Abstract:

First-passage percolation is a model for spatial growth introduced about half a century ago. The model is obtained by assigning i.i.d. non-negative weights to the edges of a graph, such as the square or cubic lattice. The non-negative weights give rise to a random metric structure on the graph. Distances in this metric can be interpreted as travel times of a growing entity. Understanding the long term evolution of this growing entity is the main objective in the area.

First-passage percolation has been intensively studied within both the mathematics and physics communities. These studies has led to a rigorous theory for subadditive ergodic processes and far reaching predictions of KPZ theory. Despite the ease of which the model is defined there are many fundamental questions that remain unanswered. We will in these lectures give an introduction to the field and the many open problems that remains.

Subjects to be treated include:

subadditive ergodic theory and the asymptotic shape

competing growth and the existence of geodesics

columnar defects and inhomogeneous growth

fluctuations and scaling theory.

Classes:

Auditorium R. Mañé
11/11, 13/11 and 14/11 – 5:00PM – 7:00PM