
Plenary Lectures
Conférences plénières

NATALIA KOMAROVA, University of California Berkley
Mathematical methods in evolutionary dynamics

Evolutionary dynamics permeates life and life-like systems. Mathematical methods can be used to study evolutionary processes, such as selection, mutation, and drift, and to make sense of many phenomena in life sciences. I will present two very general types of evolutionary patterns, loss-of-function and gain-of-function mutations, and discuss scenarios of population dynamics – including stochastic tunneling and calculating the rate of evolution. I will also talk about evolution in random environments. The presence of temporal or spatial randomness significantly affects the competition dynamics in populations and gives rise to some counterintuitive observations. Applications to biomedical problems (such as the role of aspirin in delaying cancer) will be discussed.

MIROSLAV LOVRIC, McMaster University
When a romantic meets a realist

In this lecture I will connect what we have learned in the past to what we're presently learning, in order to discuss things that might affect, or be part of, mathematics teaching and mathematics education in 10 years or so. I will include some of the activities that I've been working on with my colleagues: teaching numeracy, creating authentic applications, and using coding to experiment and learn math. Needless to say, I will also share some fun math problems that I've recently encountered.

JACOB TSIMERMAN, University of Toronto
Periods of integrals - interactions of Transcendence theory and Arithmetic

Many important mathematical constants and functions can be expressed as period integrals, both definite and indefinite. The study of their transcendence - and the existence of algebraic relations between them - is historically central to the study of algebraic curves and algebraic geometry. We shall discuss what is conjectured in both settings, some recent results in the functional setting, and some surprising connections to arithmetic.