

UNAM MINI-COURSES, 27–30 JUNE 2022

Department of Mathematical Sciences, University of Bath

	Monday 27 June	Tuesday 28 June	Wednesday 29 June	Thursday 30 June
Luis Silva	10:15–11:15 Wolfson LT	10:15–11:15 Wolfson LT	10:15–11:15 Wolfson LT	10:15–11:15 Wolfson LT
Miguel Ballesteros	13:15–14:15 Wolfson LT	13:15–14:15 4W1.2		13:15–14:15 Wolfson LT

LUIS SILVA: A modern approach to the classical moment problem.

ABSTRACT: This course deals with the classical moment problem from the viewpoint of the theory of functional models for symmetric operators and de Branges spaces. The starting point is a closed, regular, symmetric operator, from which a de Branges space is constructed. The generalised moment problem, as well as the classical moment problem as its particular case, will be introduced. We will discuss the determinate-indeterminate dichotomy and its implications for the general case. In conclusion, we will touch upon some applications in spectral theory and in the analytical sampling theory.

MIGUEL BALLESTEROS: Spectral and scattering theories for discrete Schrödinger operators and applications in biology.

ABSTRACT: We present the basic concepts of scattering and spectral theories for Schrödinger operators on the discrete real line. The Schrödinger operator (“Hamiltonian”) is the sum of the discrete Laplacian (“free Hamiltonian”) and a multiplication operator (“potential”). We study generalized eigenvectors of the free Hamiltonian, which are referred to as Free Jost Solutions (FJS). Scattering theory is presented in terms of the Jost solutions of the Hamiltonian, which are the generalized eigenvectors behaving asymptotically like FJS. Time permitting, in the last part of the course we will address a project on mathematical modelling in ecology inspired by discrete Schrödinger operators on two-dimensional finite lattices. This project involves fieldwork in the rainforest, which I will also describe together with additional mathematical tools required to analyse the model.