UCD School of Mathematics and Statistics Colloquium Seminar

Title: Weil–Peterson Curves, Traveling Salesman Theorems, and Minimal Surfaces

Speaker: Prof. Chris Bishop (Stony Brook University, U.S.A.)

Date: Fri 27th March 2026 at 2:00PM

Location: (See abstract)

Abstract: LOCATION: Icon Theatre D, Science Hub, O'Brien Centre, UCD

Coffee to follow in the room N3.20/N3.21 Science Centre North. If you plan to attend, please complete this brief form.

Weil–Petersson curves are a class of rectifiable closed curves in the plane, defined as the closure of the smooth curves with respect to the Weil–Petersson metric defined by Takhtajan and Teo in 2006. Their work solved a problem from string theory by making the space of closed loops into a Hilbert manifold, but the same class of curves also arises naturally in complex analysis, geometric measure theory, probability theory, knot theory, computer vision, and other areas. No geometric description of Weil–Petersson curves was known until 2019, but there are now more than twenty equivalent conditions. One involves inscribed polygons and can be explained to a calculus student. Another is a strengthening of Peter Jones's traveling salesman

condition characterizing rectifiable curves. A third says a curve is Weil–Petersson iff it bounds a minimal surface in hyperbolic 3-space that has finite total curvature. I will discuss these and several other characterizations and sketch why they are all equivalent to each other. The lecture will contain many pictures, several definitions, but not too many technical details.