*Short Course on Numerical Geometry of Images and Shapes*

**Ron Kimmel**, Technion

Part 1 May 16, 2:00-3:30
Part 2 May 17, 9:30-11:00
Part 3 May 17, 2:00-3:30
Part 4 May 18, 9:30-11:00
Part 5 May 18, 2:00-3:30
Fields Institute, Room 230

The 5 lectures will cover the following topics:

Introduction:
Introduction to calculus of variations of geometric functionals Differential invariants of curves and surfaces Curve evolution - affine and euclidean invariant Surface evolution and the level set method (numerical aspects in a brief).

Applications:
Edge detection and integration (active contours and the Canny-Haralick connection. Fast marching on flat and curved domains (Eikonal solvers).
Images as manifold (the Beltrami/NL-Means/Bilateral/TV/L1~Sparse filters - the metric connection).
Surfaces as metric spaces Multidimensional scaling, generalized MDS and Gromov-Hausdorff distances.

I plan to mention affine and scale invariants of curves and surfaces, and diffusion geometry. If we have time, I will also give a brief introduction to efficient computational tools for geometric capturing devices.