BI-CO MATHEMATICS COLLOQUIUM

Kim Ruane

Tufts University

"Seeing Algebra with Geometry"

Monday, October 7, 2024
Talk at 4:15 – Hilles 109
Tea 4:00 – Foyer outside of H109

Abstract:

If you are taking or have taken an Abstract Algebra class, you have probably seen the dihedral groups. They are usually the first examples of finite groups you see beyond the integers modulo n. They also provide your first examples of groups that are not abelian. You see that they are very natural because they arise as symmetry groups of objects that are familiar to you from elementary geometry. You might also know that symmetry groups come up quite naturally in chemistry – i.e. the symmetries of a molecule are related to its physical properties. What I would like to talk about is how to construct groups that have certain algebraic properties by constructing geometric objects that have those symmetries. As an example, you can "see" that the alternating group on n objects is simple for n larger than 4 if you view things in a geometric way! This is one of the central results in group theory that is used to show the insolvability of the quintic and higher degree polynomials!