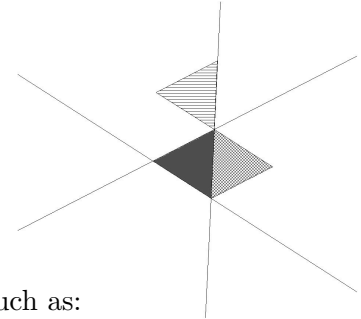


## MAT 530/690 Coxeter Groups Seminar

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*Prerequisite: MAT 505 or both of MAT 335 and MAT 421.*

Imagine an equilateral triangle sitting in the Euclidean plane, with each side extending to a line in the plane. Now imagine reflecting that single triangle around the plane using those lines. Any combination of reflections will do, be creative. Doing this ad infinitum, one obtains a tessellation of the Euclidean plane with equilateral triangles, and an example of a ‘Euclidean’ *Coxeter group*.



Coxeter groups are abstract reflection groups (i.e. they are groups generated by reflections) which have various uses and manifestations, such as:

- Symmetry groups for regular polytopes (such as regular polygons and the platonic solids) are Coxeter groups.
- Certain tessellations of the Euclidean plane (as above) and the hyperbolic plane (pictured below) can be generated by Coxeter groups. (Can those really be regular pentagons with  $90^\circ$  interior angles?) Subgroups of Coxeter groups are also useful in generating examples of hyperbolic, Euclidean and spherical manifolds.
- Moves of a simple combinatorial game played on graphs are really Coxeter group actions in disguise.

This seminar will showcase some combinatorial, geometric and topological aspects of Coxeter groups. Interested faculty are invited to attend. Our plan is for twice weekly meetings, time and room to be determined once we have a final roster of student and faculty participants.

