Math 398, Group Theory with a hint of Categories

Lecture:	Monday 12:30-1:20, *Place TBD*
Faculty Sponsor:	TBD (hopefully Jim?)
Web address:	`http://untyped.me/algebra.html`
Problem Section:	Friday 12:30-1:20, *Place TBD*
Advanced Student Mentor:	Thomas Browning
E-mail:	`thomas.l.browning@gmail.com`
Text:	*Algebra: Chapter 0*
Author:	Paolo Aluffi

The intent of this student organized math study group is to cover the basics of group theory, from a categorical perspective. The focus will be similar to Math 402, but with a slightly more abstract bent. We will use techniques common in higher algebra courses much earlier than normal, with the aim of preparing students for the graduate algebra sequence, Math 504-5-6. We do not, however, assume any prior familiarity with algebra, beyond an extremely minimal amount of linear algebra. If this quarter is successful, we may try to cover Rings and Modules in the Spring.

We will meet twice a week, every week. Students will be expected to read through the assigned section of Aluffi before the first meeting every week. During the first meeting each week, one to two students will present the material from that week's section to the class. Choosing to present during a certain week is voluntary, but all students are expected to present at least once. During the second meeting, students will present solutions to the assigned problems, like in Math 33X or Math 380. Problem sets will be generated by Thomas Browning, an advanced undergraduate student acting as a mentor for this study group. Problem sets will be posted on the course website.

Over Winter quarter, we plan to cover all of Chapters 2 and 4 from Aluffi, following this schedule:

Week 0: The language and basic concepts of Category Theory (covered before winter quarter)

Week 1: The definition of a group and examples

Week 2: Group homomorphisms and the category Grp of groups

Week 3: Subgroups, Normality, and Quotient Groups

Week 4: Canonical Decomposition and Lagrange's Theorem, Presentations and Free Groups

Week 5: Group actions, the conjugation action, and the Class Formula

Week 6: The Sylow Theorems

Week 7: Composition Series and Solvability

Week 8: The Symmetric Group

Week 9: More products of groups, exact sequences of groups, the Extension Problem

Week 10: The Classification of Finite Abelian Groups