MA528–Introduction to Modern Geometry

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Material: We all know the basic theorems of Euclidean geometry. We’ve all heard of other, non-Euclidean geometries. But what is “a geometry”? In this course, we’ll discuss several possible answers. This includes axiomatic approaches to Euclidean geometry (which is harder than it looks), synthetic (coordinate free) and analytic (using coordinates) approaches, the classical non-Euclidean geometries of hyperbolic, spherical and projective type, and finite geometries. For all of these geometries, we’ll emphasize the role of the symmetry group (or transformation group or isometry group). By the end of the course, you should see how Euclidean geometry and its symmetry group fits into a larger picture of geometries and symmetry groups.

I would like to cover material from some subset of Chapters 1, 3, 5, 6, 7, 9, 10, 11, 12, 13, as well as bringing in outside material on transformation groups. Be prepared to take good notes.

Grading: There will be a take-home midterm exam and a take-home final. Homework will count for 60% of your grade, and each exam counts for 20%. The exam will be given approximately halfway through the semester; feel free to form lobby groups to decide on the best time of the exam.

Homework: Homework will be collected and graded one week after assigned. Late homework will not be accepted. You are welcome to work together on the homework.

Excused Absences: There will be no make-up exams. If you miss the midterm for an acceptable reason, the final will count for 40% of your grade. If you miss the final for an acceptable reason, you will receive an I for the course, and we will arrange for your completion of the work. The only acceptable reasons for missing exams are substantiated medical reasons, family emergencies, religious reasons, or legal activities such as jury duty.