**Math 250: Higher Algebra**
Handout #0 (20 September 2004): About Math 250

**What?** The course description in the Course Catalog is much shorter than the two paragraphs that I sent in:

> One of the main themes of 20th-century mathematics has been the recognition of common algebraic structure in many disparate mathematical disciplines. Math 250 will introduce some of most important of these ubiquitous algebraic structures and their properties, and hint at some of their diverse applications.
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> Highlights of the first term: Galois theory, which describes field extensions (as the field of complex numbers extends the real field); the Brauer theory of central simple algebras (such as the Hamilton quaternions over the reals); and representation theory of finite groups, in which groups are studied by their action on finite-dimensional vector spaces.

**Who?** While officially a first-year graduate course, Math 250 is also accessible to advanced undergraduates who have already taken Math 123 or an equivalent algebra class. As usual for 200-level courses, I must sign the study card of any undergraduate taking this class for credit.

**Texts** There isn't a single text that covers all the material for Math 250. We will thus follow chapters from different books for the various topics of the course. These books will be put on reserve at the Birkhoff (3rd floor math) library, and several copies will be available for perusal or loan at Cabot library (1st floor of the Science Center); you will not be required to purchase any of these texts. We'll begin with the fourth chapter of Jacobson's *Basic Algebra* as our main source for Galois theory and related matters.

**Grading** If you are taking 250 and are not EXCused graduate student, you will get a grade for the class. Most of your grade (about 2/3) will be based on regular *problem sets*. There is no final exam; instead, a final paper will account for most of the remaining 1/3 of your grade, with class participation used mostly to decide borderline cases. The final paper should be an exposition of one of the many topics in algebra that we will not cover in this class. Before embarking on this project, you should consult me to determine an appropriate topic and scope for your paper.

**Office information, etc.** My office is Room 335 of the Science Center (right outside the math library on the 3rd floor), telephone #(49)5-4625; my e-mail address is `elkies@math`. Course URL: www.math.harvard.edu/~elkies/M250.04; I'll post most handouts, problem sets, etc. on that page. Office hours are Thursdays 3:00–4:30 (exception: 3:00-4:00 on Colloquium Thursdays), or by appointment. Grader/TA to be announced; section time and place will be determined once the class roster has stabilized and we know what everybody's schedule is.

**Note** I'll have to miss a few classes during the course of the term. These will be announced in advance. I might have to schedule one or two extra class meetings during Reading Period.