Course syllabus for Math 6122
Algebra II

Spring 2018

Course description: This is the second course in the graduate sequence on abstract algebra. Traditionally this course serves both as a topics course and as preparation for the comprehensive exam, and we will do both. We will cover Galois theory, Group/Galois cohomology, and the Brauer group. We will also cover classification of modules over a PID.

Text: No text is required, but either of the following may be helpful:

Abstract Algebra, 3rd edition by David S. Dummit, Richard M. Foote John Wiley and Sons

Algebra, revised third edition by Serge Lang Springer

I will make additional resources available.

Time and place: Tuesday Thursday 12:00- 1:15pm. Skiles 246. Webpage via T-square.

Instructor contact information: Kirsten Graham Wickelgren,
e-mail: kwickelgren3@math.gatech.edu,
office: Skiles 148.

Office hours:

- Thursday 1:15-2:15pm.
- Monday 12:50-1:50pm.

or by appointment.

Office hours will be rescheduled during certain weeks of the semester.

Prerequisites: Math 6121.

Homework: There will be problem sets due roughly every two weeks on Tuesdays. You may collaborate on your problem sets, and in fact you are encouraged to do so, if you wish. Your solutions should be written up separately and in your own words. You may also use outside sources, but please only do so in a manner helpful to your education. Your sources and collaborators must be credited in writing on your work. There will also be a final paper due at the end of the semester. You may choose the topic of your final paper. Please run it by me before you start working on it. Some suggestions are:

- Tannakian Categories, as in the article by Deligne and Milne .
- étale fundamental group. A possible reference is Ariane Mézard *Fundamentl Group*
- Correspondence between Riemann surfaces and field extensions of $\mathbb{C}(t)$. A possible reference is Forster *Lectures on Riemann Surfaces*
- Brauer group of a scheme/Azumaya algebras. A reference is Milne *Etale cohomology*
- Derived functors.
- Spectral sequences.
- Brauer-Manin obstruction to rational points.

  I'll add more to this list when the time comes to start working on these, and provide a handout specifying some guidelines.

Grading: You will be graded on a selection of problems from each problem set and a final paper. Number grades will be determined by weighting the problem sets by 2/3 and the final paper by 1/3. Letter grades will be determined after the number grades, using natural cut-offs in the distribution.

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