

**MATH 1540: Abstract Algebra**  
**Tu-Th 10:30-11:50**  
**Barus & Holley 159**  
**Prof. Richard Schwartz (res@math.brown.edu)**  
**Office Hours: TBD**

**Course Description:** This is a course in abstract algebra. The first half of the class is about Galois theory, a subject which is a mixture of field theory, group theory, and the theory of polynomials. For this half of the class, I plan to cover Chapter 5 in Herstein's *Topics in Algebra, 2nd Ed.* and the part in Chapter 7 dealing with the classification of finite fields. The second half of the class will be about elliptic curves. For this, I will use some chapters from the book *Rational Points on Elliptic Curves* by Silverman and Tate, and also some of my own notes.

**Objectives:** Here are 4 main objectives for the class.

1. Learn the basic connection between polynomials, fields, and groups, as explained in the Fundamental Theorem of Galois Theory.
2. Solve challenging problems in abstract algebra related to the course material.
3. Practice writing mathematical proofs.
4. Develop algebraic intuition and an appreciation for algebraic structure.

**Grading:** Your grade has 4 components.

- HW: 35%
- Midterm: 30%
- Final: 35%

We will discuss the situation one-on-one in case you miss the midterm exam.

**HW Assignments:** There will be weekly HW assignments. The assignments will consist of 5 to 10 problems each week from the book. I will post the assignments on my website (<http://www.math.brown.edu/~res/M1540>)

each Tuesday and then collect them the next Tuesday in class. There is no late HW allowed.

You are allowed to discuss the HW with other people in the class, but I think that it is better for you to do the HW largely on your own. If you do discuss the HW with other people, you should list their names on your assignment when you turn it in.

**Exams:** We will decide the dates of the midterms by class vote. I hope to have the midterm around the week 7. I will probably hold the midterms in the evenings, where we can allow several hours for the exams. The purpose of having a long-format in-class exam is remove time pressure from the exam without having the uncontrolled environment associated with a take-home exam. The final exam will be an in-class exam lasting 3 hours.

**Readings:** The main book for the course is *Topics in Algebra, 2nd Ed.* by I. N. Herstein. I don't know how much Brown sells this book for, but I noticed that you can get a copy on amazon.com for as low as \$22, and that there are a number of copies under \$50. I will also hand out some chapters from the book *Rational Points on Elliptic Curves* by Silverman and Tate.

**Accommodations:** Brown University is committed to full inclusion of all students. Please inform me, as soon as possible, if you have any conditions which might require special consideration. For more information, please contact the Student and Employee Accessibility Services (SEAS) at SEAS@brown.edu or 401.863.9688.

**Credit Hours:** The class meets 2.5 hours per week, for 13 weeks. This totals to about 33 hours of in-class material. There will be weekly readings from the book and (as mentioned above) weekly HW assignments. Given the wide range of students taking an upper level math class, it is impossible to give a precise estimate on the amount of time these readings and assignments will take, but it seems not unreasonable to say that *on average* these tasks, together with studying for exams, will take will take between 11 and 12 hours per week, totalling about 147 in all. So, the total time the average student can expect to spend on this class is 180 hours.