

**Math 301-02, Abstract Algebra, Fall 2014**  
MWF 9:35-10:40 am, BEC LL17

**Instructor:** Amy DeCelles

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**Course Prerequisites:** A grade of C- or above in MATH 240

**Credits and Workload Expectations:** 4 credits: 8-10 hours per week outside the classroom.

**Textbook:** *Learning Modern Algebra From Early Attempts to Prove Fermat's Last Theorem*, by Al Cuoco and Joseph J. Rotman

**Overview:** We take an historical approach to abstract algebra: studying approaches to prove one of the most famous theorems in mathematics, Fermat's Last Theorem (FLT). This is somewhat of a misnomer, because Fermat did not prove this theorem; he merely made a private note in the margin of one of his books claiming to have a proof. After his death, when the margin note, but no proof, was discovered, mathematicians took on the challenge of finding a proof. The "theorem" turned out to be more subtle than anyone expected, and, while a proof eluded mathematicians for centuries, their prodigious efforts drove the creation of abstract algebra. We will start our study in the concrete setting of the integers, then move to more exotic mathematical structures like the Gaussian integers and integers modulo  $n$ , which motivate the more abstract notion of a commutative ring. We continue with field theory to study Abel and Gauss' work towards proving FLT, and end with a brief overview of the way in which the theorem was finally proven, by Wiles and Taylor in the 1990s.

**Course Objectives:**

- Gaining factual knowledge (terminology and methods of abstract algebra)
- Learning fundamental principles, generalizations, and theories (noticing patterns, working with abstract mathematical objects)
- Developing skill in expressing myself orally or in writing (clear written explanations of mathematical processes and results, formal mathematical arguments)

**Homework:** Homework is assigned in a "rolling trio": reading assignments, discussion problems, and written problems. For example, for Monday February 17, you are to write up the solution to a problem from Section 1.3 (which we will have discussed already, in class Friday Feb 14), work on discussion problems for Section 1.4 (which we will discuss in class on Monday Feb 17), and read and answer questions on Section 2.1 (which we will discuss in class Wednesday Feb 19).

**Late Work, Missed Exams:** Late work is not accepted. Extensions may be granted if requested before the due date. Assignments submitted after the due date must be submitted to

the professor in person. Make-up midterm exams or quizzes may be given to students with legitimate excuses such as verified illness, University sponsored events, etc., as long as the make-up exam can be taken within a reasonable time frame. If it is not possible to schedule a make-up exam within a reasonable time frame, the grade for the midterm may be prorated from the final exam. Written documentation is required.

**Final Course Grade:** The overall score for this course will be computed as outlined below. Final letter grades will be assigned based on the overall score, with the two major components, written work and quiz/exams also being considered separately. In particular, the final letter grade will not be higher than one letter grade above the level of the work on written work or the work on exams. Exceptional performance on the final may also be taken into account.

- Homework and class participation (40%): reading questions (5%), discussion problems (5%), written problems (30%)
- Quizzes (10%): first quiz scheduled for Feb 14
- Midterm Exams (30%): tentatively scheduled for Feb 26, Apr 4, May 9
- Final Exam (20%): cumulative; 8:00 am - 10:00 am Wed May 21

**Disability Accommodations:** Qualified students with documented disabilities who may need classroom accommodations should make an appointment with the Disability Resources office. Appointments can be made by calling 651-962-6315. You may also make an appointment in person in Murray Herrick, room 110. For further information, you can locate the Disability Resources office on the web at <http://www.stthomas.edu/enhancementprog/>.