Math 351 Syllabus	Spring 2022	Laurel Langford
Abstract Algebra	12:00-12:50 MWF NH 16	laurel.langford@uwrf.edu
Section 1; Credits: 3	Final exam: 1:00-3:00 05/11/22	http://langfordmath.com/

Office hours (getting help): 1:15-3:00 in NH 207B MWF, and by appointment.

Text: you should have the textbook Abstract Algebra: an Introduction by Hungerford (3rd ed.)

Announcements and assignments will be posted in Canvas as well as being announced in class.

Goals for this class:

- Understand how the generalized structures of abstract algebra connect to the familiar structures of numbers, functions and polynomials.
- Understand how results (theorems) are built from assumed properties (axioms) in mathematics.
- Be able to prove theorems using algebraic properties and techniques.

Lecture and discussion: You should plan to be in class each day, ready to work and discuss abstract algebra problems. If you can't be in class, please email me, and I will stream the class time. You must be an active participant whether in class or on line to be successful.

Assignments: Homework will be assigned and collected on a regular (frequent) basis. Homework is where you find out if you really understand what's going on, and it shows you what you need to figure out and get help with to be successful in this class. If you are not able to be in class on an assignment due date, you should scan your pencil and paper emailing it to me. I recommend testing out a few of the scanner apps for your cell phone to see what works best for you. (You may also, of course, submit computer typed work, or work written on a tablet directly into a file, but learning how to get proper math notation into a computer takes some learning by itself!). I prefer to have assignments scanned for submission by an app that will compile all of the pages into a single .pdf document with a picture quality that gives both an image that is readable and a file size that is small enough to attach to an email (10 MB). You may need to experiment with available cell phone apps to find one where you can get appropriate settings.

Attendance, presentations and class participation: There will be many opportunities in the class for discussion, and I will look for opportunities to have you explain your solutions of problems and proofs of theorems to the class.

Tests: I am planning to give three tests plus a final exam. The final exam will be cumulative, but weighted towards the final third of the course content.

Grading: Your grade will be based primarily on your scores on homework, participation, quizzes and the final exam. Homework will count as 20% of your grade, and the quizzes and final exam will count as 80% of your grade. Your grade will be based primarily on the weighted average of your scores. Letter grades will be at least as high* as those determined by your weighted average and these percents:

A: 94-100%	A-: 90-93%	B+: 87-89%	B: 84-86%	B-: 80-83%
C+: 77-79%	C: 74-76%	C-: 70-73%	D+: 67-69%	D: 60-66%

*I will occasionally raise a grade for someone who shows a greater understanding of the content (eg. in class discussions and presentations) than is reflected in the test scores, but I never lower a grade below what is indicated by the weighted average).

Course Objectives

At the end of this course students will be able to:

- Identify algebraic properties of familiar mathematical objects including integers, real numbers and polynomials and will be able to identify examples of algebraic structures such as rings, fields and groups.
- Prove conjectures using algebraic properties.

Required Course Content

I. Integers
A. Divisibility
B. Greatest common divisors
C. Prime factorization

II. Modular Arithmetic
A. Properties of congruence and equivalence classes
B. Structure of numbers with a prime modulus: units and zero-divisors

III. Rings and Fields
A. Definitions
B. Examples, including modular arithmetic and matrices
C. Proving basic properties of rings and fields
D. Homomorphisms and Isomorphisms
E. Polynomials over a field
F. Ideals and quotient rings

IV. Groups
A. Definitions
B. Examples, including symmetries and permutations
C. Proving basic properties of groups
D. Homomorphisms and Isomorphisms of groups.

Mode of Instruction: Face to Face
Prerequisites: Math 256 and 236.

The UWRF promotes safe, inclusive and effective learning environments that protect the rights and support the interests of both students and faculty. For additional information regarding our inclusivity expectations, academic accommodations, academic conduct expectations and processes, and other syllabi information, please consult http://go.uwrf.edu/Syllabi

Teacher Content Standards: Information about teacher content standards covered by this course can be found at: https://www.uwrf.edu/MATH/WisconsinContentTeacherStandardsMathematicsCourses.cfm.

Late work: Late work will be accepted at my convenience. Late work may earn partial or full credit, depending on when it is turned in. Typically, if the work is turned in before I have a chance to grade that assignment, your work will be graded with the rest of the class and will receive full credit. If you turn in work after I have graded the assignment for the rest of the class, you may still get partial credit (default at 50%) if the work is done in a reasonable amount of time (approx. 1 week).

Missed tests can be made up for partial credit (expect 75%) if you contact me promptly (I should hear from you before the next class meeting if you miss an exam) and reschedule to take the exam promptly. I may choose to allow a late exam for full credit in cases of an excused absence (see above). If you are missing an exam for a university sponsored event, you should be contacting me in advance to schedule your test. As with final grades, I may choose to give higher amounts of partial credit for late work depending on the circumstances.