Course Syllabus

CSU Math 366: Introduction to Abstract Algebra, Spring 2021

Instructor: Henry Adams
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Lectures: MWF 12:00–12:50pm on Zoom
Class Webpage: http://www.math.colostate.edu/~adams/teaching/math366spr2021
Office hours: Please email me at any time to arrange an appointment. In that email, please let me know if the topic is private (which is not a problem), or if it public (say about class content). I will then announce any public office hours to the rest of the class, inviting them to join.

Textook: *Abstract Algebra: Theory and Applications* by Thomas W Judson. This book is freely available as a PDF, and you can find more resources at the book webpage. The book has selected exercise hints in the back, which is great!

Prerequisites: The official prerequisite is Math 161 (Calculus for Physical Scientists) or Math 271 (Applied Mathematics for Chemists I). The unofficial prerequisite is a certain level of mathematical maturity.

Course Overview: This course is a rigorous and proof-based introduction to abstract algebra. Topics covered include sets, integers, polynomials, real and complex numbers, groups, integral domains, and fields.

Requirements: Your final grade will be based on 90% homework, and 10% attendance and participation.

Respecting your time: If I ever get cut off the zoom call for more than 10 minutes (or am more than 10 minutes late) due to network issues, then class is cancelled for the rest of the day, and I will follow-up with you all via email.

Homework: The clarity of your solutions will count as much as their correctness, and all steps must be explained. *A homework problem with no English words will be returned without being graded.* Working in groups on homework and to study is encouraged! However, your submitted homework must be written up individually, in your own words, and without consulting anyone else's written solutions or a solution manual of any form.

Academic Policies and Integrity: Students are expected to adhere to the CSU Academic Integrity Policy as found on the Students' Responsibilities page of the CSU General Catalog. Posting course materials on external sites violates the CSU Student Conduct Code.

Colorado State University is committed to providing reasonable accommodations for all persons with disabilities. Students with disabilities who need accommodations should first contact the Student Disability Center in order to request accommodations for this class.

CSU Principles of Community:
Inclusion — Integrity — Respect — Service — Social Justice
See the additional detail at the VPD's website.

Learning Objectives:
Groups:
- Students will know the definition of a group, will be able to check if a set equipped with an operation is a group or not, and will know the basic examples of groups: groups of numbers, groups of matrices, groups of symmetries, vector spaces.
- Students will know the definition of homomorphism and isomorphism, will be able to check if a given function is one, and will be able compute a homomorphism's kernels and images.
- Students will be able to check if a given subset of a group is a (normal) subgroup, and will be able to compute in quotient groups.
- Students will be able to apply group actions to enumerate symmetries.

Rings:
- Students will know the definition of a ring, and will be able to check if a set equipped with 2 operations is a ring or not.
- Students will know the basic examples of rings (rings of numbers, of matrices, of polynomials, etc.) and their basic properties (nilpotence of elements, zero-divisors, ideals, etc.).
- Students will know the definition of an ideal, and the construction of a quotient ring.
- Students are able to encrypt messages using public key cryptography (such as RSA).

Fields:
- Students will know the definition of a field, and be able to check if a ring is a field. They will know the basic examples of fields (of numbers, of rational functions, etc).

Mathematical maturity:
- Students will be able to differentiate between definitions, axioms, theorems, and proofs.
- Students will be able to construct mathematical proofs, and critique incorrect mathematical arguments.