Math 541 Modern Algebra I

Institution Name: University of Wisconson-Madison

Credits: 3

Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement

Official course description: Groups, normal subgroups, Cayley's theorem, rings, ideals, homomorphisms, polynomial rings, abstract vector spaces.

Requisites: (MATH 234 or 375), (MATH 320, 340, 341, or 375), and (MATH 341, 375, 421, 467, or 521), or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program

Instructor: Chenxi Wu

Email: cwu367@wisc.edu

Modes of Instruction: In person.

Lecture: 1:00-2:15pm Tu Th VV B139.

Office Hours: 10-11 am Wednesday and Thursday at Van Vleck 517, or by appointment.

This is an introductory course on algebra. We will cover basic properties of groups, rings, fields a, and their applications.

Learning goal:

1. Understand the definitions and basic properties of groups, rings, fields and modules.

2. Practice reading and writing mathematical proofs.

3. Able to apply concepts and ideas in abstract algebra to other areas of mathematics.

4. Able to define and recognize simple algebraic structures, investigate their structures and classify them.

Textbook: Dummit and Foote, *Abstract Algebra*. I will also post detailed lecture notes on Canvas.

How Credit Hours are met: This class meets for two, 75-minute class periods each week over the fall/spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 3 hours out of the classroom for every class period. The syllabus includes more information about meeting times and expectations for student work.

Canvas Support: `https://kb.wisc.edu/luwmad/page.php?id=66546`

Grades: We will have weekly homework (10%), one in-class midterm exam (35%) and one final exam (55%). HW problems will be posted on Canvas every weekend, due on the Monday after the next weekend. Please submit your solution as a single pdf file via Canvas.

All HW or midterm grades that are lower than final grades will be replaced by final grades. For example, if one has 0/10 in HW1, 9/10 in HW2, 50/100 in midterm and 80/100 in final, then the HW1 grade will be replaced by 8/10 and midterm grade will be replaced by 80/100. HW2 grade will remain unchanged. Since all missing HW grades have been automatically replaced by final grades, no late HW will be accepted. The final exam will be cumulative. All exams will be open book and open notes but electronic devices will not be allowed.

If the cumulative grade is ≥ 90 then one gets A, if ≥ 75 one gets B or above, if ≥ 60 one gets C or above.

This is a tentative list of topics we may cover in this semester:

1. A review of set theory notations.

2. Groups, group actions and examples.

3. Orbit decomposition and Permutation Representation.

4. Isomorphism theorem.

5. Rings, fields, modules and examples.

6. Ideals and left ideals.

7. Chinese remainder theorem, Euclidean domains and PIDs.

Institutional Level Academic Policies: `https://teachlearn.wisc.edu/course-syllabi/course-credit-information-required-for-syllabi/`