Math 542, Modern Algebra II

Number of Credits: 3 credits
Canvas Course URL: https://canvas.wisc.edu/courses/111741

Course Designation or Attributes: None

Meeting Time and Location: TR 2:30-3:45 in Van Vleck B119

Instructional Mode: Face to face

Credit hours: This class meets for two 75-minute class periods each week over the 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 classroom for every class period. The syllabus includes more information about meeting times and expectations for student work.

INSTRUCTOR:
Andrei Caldararu
Office hours and location: Tuesdays 1:30-2:30pm and/or by appointment, Van Vleck Hall 605

Email: andreic@math.wisc.edu

OFFICIAL COURSE DESCRIPTION

Math 541 and 542 together constitute an introduction to modern algebra at the undergraduate level. Math 542 covers rings, modules, linear algebra (at a level deeper than Math 340), and a little field theory. It is essential for students preparing for graduate studies in mathematics and in some related fields.

Requisites
Math 541.

LEARNING OUTCOMES

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

- Give definitions of algebraic objects related to rings, modules, fields, and vector spaces; see below for a detailed list of topics.
- Recognize the appearance of these objects in examples and confirm this rigorously using the definitions.
- Operate with the objects and use their properties to solve problems.
- Express themselves in a mathematically rigorous way.

TEXTBOOK

Abstract Algebra, Dummit and Foote, 3rd edition.

GRADING

- Homework Assignments 30%
- Midterm 30%
- Final Exam 40%

In case of unforeseen circumstances (e.g., the university is closed on the day of the final), alternative arrangements for grading may be necessary, so try not to rely on the final too much.

EXAMS

There will be one in-class midterm, preliminarily scheduled for October 25th (Thursday). The final is on Tuesday, December 18th, 10:05-12:05. The final is cumulative. By signing up for this course you are agreeing to take the final exam at the scheduled time by the University.

HOMEWORK ASSIGNMENTS

Homework is assigned weekly, and due in class, usually on Thursday. Feel free to discuss the assignment with me, other students, or anyone else, however, you should write your own work, representing your understanding. Calculators/computer algebra systems (such as SAGE) are allowed for homework, but not on the midterm or the final. The lowest homework grade is dropped, which means you can skip one homework.

HONORS OPTION

This course has an optional honors component. You will receive honors credit if you: hand in the three extra honors problem sets, receive at least 60% on the sets, and receive at least an AB in the course. If you are signed up for honors credit and you fail to meet these criteria, then it is your responsibility to remove the honors credit from your registration. The extra assignments may require some additional reading.

COURSE OUTLINE

Generally, the course follows the book: after a short review of rings (Chapter 7), most of our time will be spent on modules over rings and vector spaces over fields (Chapters 10, 11, and 12). After this, we will discuss field extensions (Chapter 13, and perhaps some of Chapter 14). Unlike the book, I plan to cover the vector spaces (Chapter 11) before modules (Chapter 10). I also plan to skip everything related to tensor product. The rough list of topics includes (with ? marking some topics that may be partly omitted):

- Prime and maximal ideals.
- Rings of quotients.
- Chinese Remainder Theorem.
- Euclidean domains, principal ideal domains, and unique factorization domains.
- Vector spaces.
- Modules.
- Modules over principal ideal domains. Jordan canonical form. (?)

- Field extensions.
- Introduction to Galois Theory. (?)

RULES, RIGHTS & RESPONSIBILITIES

- See the Guide's to Rules, Rights and Responsibilities.

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to https://conduct.students.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA." http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

DIVERSITY & INCLUSION

Institutional statement on diversity: "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." https://diversity.wisc.edu/