

PMATH 348 Fields and Galois Theory Winter 2025

Instructor: Yu-Ru Liu

Office: MC 5018

Office hours: Mondays, 9:30-10:30 am

Objective This course is designed to introduce to students the Fields and Galois theory. The following topics will be covered:

- More Ring Theory (week 1-3)
unique factorization domains, principal ideal domains, Eisenstein's criterion
- Field Theory (week 4-6)
fields, algebraic and transcendental extensions, minimal polynomials, splitting fields, finite fields, separable polynomials
- Galois Theory (week 7-10)
solvable groups, automorphism groups, separable and normal extensions, Galois extensions, fundamental theorem of Galois theory
- Applications (week 11-12)
cyclic extensions, solvability by radicals

Web Interfaces

- Course website on LEARN: the Content folder
- Discussion forum on Piazza
- Möbius Quizzes: LEARN \rightarrow Content
- Crowdmark Assignments: email links

Textbook There is no required textbook. All lectures are self-contained.

Möbius Quizzes There are ten quizzes, but only the best nine out of ten grades will be counted. Each quiz contains quick answer questions (T/F, easy computation, etc.). The quiz is 20 minutes, but you are given 30 minutes to complete it if you need extra time. Since quizzes are timed assessments, it is important to know the contents well before taking them. **You need to complete quizzes independently with no collaboration.**

Crowdmark Assignments There are ten assignments, but only the best nine out of ten grades will be counted. Each assignment contains proof questions. While you are encouraged to work together to solve assignment questions, the solutions you submit must be your own work. Please do not post assignment solutions on Piazza or another platform. There are bonus questions on Assignments 2, 4, 6, and 8. Their total marks equal to an assignment and can be used to replace the second lowest assignment mark.

Both Möbius Quizzes and Crowdmark Assignments are due at 5:00 pm on designed Wednesdays. **No late submissions will be accepted.**

Tests There are two in-class tests:

Test 1 will take place on **Friday, February 14th, 2025, 8:30-9:20 am.**

Test 2 will take place on **Friday, April 4th, 2025, 8:30-9:20 am.**

Final Grade

Möbius Quizzes 20%

Crowdmark Assignments 30%

Test 1 20%

Test 2 30%

Pandemic Contingency Planning If there is a cancellation of in-person classes due to the pandemic (whether for the short-term or long-term),

- Lecture Notes will be posted on LEARN weekly.
- Weekly Möbius Quizzes and Crowdmark Assignments will be continued.
- Tests will be conducted online at the scheduled time slots.

Academic Integrity In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility, check <http://www.uwaterloo.ca/academic-integrity> for more information.

Grievance A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70> When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. Check <https://uwaterloo.ca/academic-integrity/> for more information. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the undergraduate associate dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline, <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71> For typical penalties, check Guidelines for the Assessment of Penalties, <https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties>

Appeals A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals, <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72>

Note for students with disabilities AccessAbility Services

<https://uwaterloo.ca/accessability-services/>

located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Turnitin.com Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.

Mental Health Support The Faculty of Math encourages students to seek out mental health support if needed. You can find the UW Mental Health Widget link on LEARN, which links to

<https://uwaterloo.ca/campus-wellness/get-mental-health-support-when-you-need-it>

Diversity It is our intent that students from all diverse backgrounds and perspectives be well served by this course, and that students learning needs be addressed both in and out of class. We recognize the immense value of the diversity in identities, perspectives, and contributions that students bring, and the benefit it has on our educational environment. Your suggestions are encouraged and appreciated. Please let us know ways to improve the effectiveness of the course for you personally or for other students or student groups. In particular:

- We will gladly honour your request to address you by an alternate/preferred name or gender pronoun. Please advise us of this preference early in the term so we may make appropriate changes to our records.
- We will honour your religious holidays and celebrations. Please inform of us these at the start of the course.
- We will follow AccessAbility Services guidelines and protocols on how to best support students with different learning needs.