Purdue University, Fall 2025
Abstract Algebra, 3 cr, **MA 45300-001, 45300-002, CRN 48941, 48942**
Syllabus

Professor: Uli Walther
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Course Description/Prerequisites

Course description: Fundamental properties of integers, polynomials, groups, rings, and fields, with emphasis on problem solving and applications. MA 375 or MA 385 are helpful but not required. Not open to students with credit in MA 450.

Prerequisites: Linear algebra, exposure to proofs.

1 General Information

1.1 Purdue Pledge

As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together—we are Purdue.

1.2 Class time / location:

Lecture: MWF 8:30-9:20 and 9:30-10:20 in PHYS 202.

Purdue Policy requires students to come to lecture and recitation.

Students bear the responsibility of informing the instructor of missed class time in a timely fashion. Aside from sudden, documentable, illness, this means "ahead of time".

1.3 Dates:

Instruction begins Aug 25 and ends Dec 12. Off-days are Sep 1 (Labor Day), Oct 13-14 (Fall break), Nov 26-28 (Thanksgiving). Finals week is Dec 14-20.

1.4 Office Hours/Instructor contact:

Office hours M 11:30-12:30am and Th 10:30-11:45am in my office.

1.5 Reading material:

The main course material are the lecture notes showing on the main 453 page (see next item). Everything that will be tested on will be said in class or appear in homwork assignments.

Reference book: *Abstract Algebra* by I.N. Herstein, which can be downloaded from
`https://archive.org/details/Herstein3thEditon`.

This book is supplemental; I wil not follow it in sequence. You may download it and use it as a reference resource.

1.6 Webpages:

Main Course Page (syllabus, assignments, course calendar, etc) `http://www.math.purdue.edu/~walther/teach/`

Brightspace: `https://purdue.brightspace.com`

Gradescope: `www.gradescope.com`

1.7 Statement for Students with Disabilities

Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

If you have been certified by the Disability Resource Center (DRC) as eligible for academic adjustments on exams or quizzes see www.math.purdue.edu/ada for exam and quiz procedures for your mathematics course. If you have questions please send email to Stephanie Foster (foster80@purdue.edu)

In the event that you are waiting to be certified by the Disability Resource Center we encourage you to review our procedures prior to being certified.

For all in-class accommodations please contact your instructor as soon as possible, preferably at the first meeting. Here are instructions for sending your Course Accessibility Letter to your instructor: https://www.purdue.edu/drc/students/course-accommodation-letter.php

1.8 CAPS Information

If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) via http://www.purdue.edu/caps/ or (765)494-6995 (these should work at any time at all), or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

1.9 Basic needs

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 am-5 pm Monday through Friday. Considering the significant disruptions caused by the current global crisis as it related to COVID-19, students may submit requests for emergency assistance from the Critical Needs Fund

2 Course Structure

2.1 Material covered

Refer to the course calendar,
`www.math.purdue.edu/~walther/teach/453/2025/453f25calendar.html`

2.2 Grading

If you disagree with the grading in any category, you need to resubmit the item in question **with a written coherent explanation** stating *why* (and not just *that*) you deserve more credit. If If this explanation is unclear or lacking in good arguments, the appeal will be rejected. Do not argue "I wrote a lot of stuff, so I deserve a lot of points."

2.3 Homework

HW is due Tuesays and Fridays via `gradescope` upload, at midnight. See the assignment sheet and the course calendar on our webpage for information what to submit on what day.

Homework must be **readable**. Illegible scribblings will receive no credit from the grader.

No late assignments will be accepted. Neither will homework deposited anywhere else.

For `gradescope` uploads: upload is problem by problem. You can upload a page that contains several problem solutions, but you must upload it to each problem separately. Submit only **pdf files**.

You are encouraged to discuss all problems with your classmates. However, the **write-up must be of your own**. See Subsetion 3.2 below.

2.4 Exams:

There will be one 60 minute evening midterm, in October. Makeup tests may be given in extraordinary instances such as covid, but only with *documented* reasons.

The 60 minute final will be in finals week.

2.5 Dead Week

Assignment 14a is due on the Sunday before dead week, on December 7. Assignment 14b you do not need to turn in, but the material it covers may show up on the final.

2.6 Course Grade:

Your course grade will be determined by a curve, using the following distribution:

HW	60%
Midterm	20%
Final	20%

As per department policy:
Students who get at least 97% of the total points in this course are guaranteed an A+, 93% guarantees an A, 90% an A-, 87% a B+, 83% a B,80% a B-, 77% a C+, 73% a C, 70% a C-, 67% a D+, 63% a D, and 60% a D-; for each of these grades, it's possible that a somewhat lower percentage will be enough to get that grade. In a recent installation the cut-offs for A+ through C were 93, 87, 80, 75, 70, 65, 60, 55.

2.7 Calculators

Calculators are **not permitted** on tests.

2.8 Course learning outcomes

The students will gain knowledge, overview, and understanding in the following four modules: basic number theory; groups; rings; fields. Students will assimilate these concepts while exploring mathematical structures, and learn to fomulate and prove facts about them.

Successful mastery of the theory and praxis of the following notions are fundamental to passing the course: mastery of induction; determination of group theoretic properties; description of normal subgroups; analysis of morphisms; actions of groups on spaces; Euclidean algorithm and its consequences; structure of finitely generated Abelian groups; field extensions and their symmetries.

3 Being a member of the university community

3.1 Classroom Safety

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Here are ways to get information about such events.

- Course and class web pages (see item 1.6)
- In particular, review the instructions on `https://www.math.purdue.edu/~walther/teach/emergency/emergency.pdf`.

  PURDUE WANTS YOU TO KNOW:

  Emergency preparedness is your personal responsibility. Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus.
- For any emergency call 911.
- There are nearly 300 Emergency Telephone Systems throughout campus that connect directly to the Purdue Police Department (PUPD). If you feel threatened or need help, push the button and you will be connected to the PUPD.
- Fire alarm: immediately evacuate the building; do not use the elevator.
- Shelter in Place requirement for a tornado warning (siren): shelter in the lowest level of this building away from windows and doors.
- Shelter in Place requirement for a hazardous materials release: stay in our classroom shutting any open doors and windows.
- Shelter in Place requirement for an active threat such as a shooting (siren): stay in our classroom and try to lock it.

3.2 Academic Honesty:

• Incidents of academic misconduct in this course will be addressed by the course instructor and referred to the Office of Student Rights and Responsibilities (OSRR) for review at the university level. Any violation of course policies as it relates to academic integrity will result minimally in a failing or zero grade for that particular assignment, and at the instructor's discretion may result in a failing grade for the course. In addition, all incidents of academic misconduct will be forwarded to OSRR, where university penalties, including removal from the university, may be considered.

• **The mere suspicion of cheating during exams may—for the suspect—turn the exam mode from written to oral.**

• **Posting solutions anywhere or getting them from the web is not permitted.** This includes chegg.

• In order to prevent cheating, we ask that you keep your eyes on your sheet at all times during exams. Looking around is forbidden. **I may, during the exam, ask some students to switch places. This does not necessarily imply I suspect them of cheating.**

• All electronic devices are forbidden during exams. This includes calculators, cell phones, PDAs, music players, and smart phones and ANYTHING ELSE of electronic nature.

• Working on an exam either before or after the official time is considered cheating. The exam of any student who is caught writing after time is up or before the exam begins may receive a grade of zero on the entire test, and may also be reported to the Dean of Students. The office of the Dean of Students may choose to apply further punishment.

• Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert the university of potential breaches by either emailing `integrity@purdue.edu` or by calling 765-494-8778. While information may be submitted anonymously, more information submitted provides a greater opportunity for the university to investigate the concern.

3.3 Classroom Rules:

• Unless other arrangements have been made with the instructor, phones and other communication devices must be turned off and stowed away during class.

• Respect your instructor, your TA, and your fellow classmates. Students who act in a disruptive or disrespecful manner (e.g., arriving late, texting, sending email, surfing the web, talking, no masks, etc.) may be asked to leave the classroom.

• All course material is copyrighted. ANY reproduction or storage in a retrieval system (e.g. the Internet) is prohibited without an explicit agreement with the author of the work. This includes course notes (including your own), homework questions, and exams.

• Taking pictures or making audio/video recording of the lectures is prohibited without the instructor's prior approval. The instructor can forbid all recording.

• Ultimately students are responsible for all required coursework and bear full responsibility for any academic consequences that may result due to absence: `www.purdue.edu/studentregulations/regulations_procedures/classes.html`

3.4 Nondiscrimination

Please see `https://www.purdue.edu/purdue/ea_eou_statement.php`