

# Intro. to Modern Algebra - MTH 343 (CRN 34796)

Winter 2019

**3 credits**

- Class meetings: MWF 11-11:50am in Strand 162
- Instructor: Dr. Filix Maisch
- E-mail: maischf@math.oregonstate.edu
- Office: Kidder 368C
- Office and Office Hours: Kidder 368C, MW 4-4:50pm and F 3-3:50pm (Fri. in MSLC – Kidder 108H)

**Prerequisites:** MTH 341 and 355, with a minimum grade of C-.

**Textbooks:** No textbook is explicitly required. It is recommended that you get either (or both) of the following as a resource:

- A First Course in Abstract Algebra, Fraleigh (any edition)
- Abstract Algebra, Herstein (any edition)

**Course Description:** This course is an introduction to groups, rings, and fields with an emphasis on the integers and polynomial rings with selected applications.

**Course Content:** Binary operations; Groups; Cyclic Groups; Symmetric Groups; Alternating Subgroups; Subgroups; Normal Subgroups; Simple Groups; Group Homomorphisms and Isomorphisms; Quotient Groups; Group Actions; Rings; Subrings; Integral Domains; Polynomial Rings; Ring Homomorphisms and Isomorphisms; Ideals; Prime and Maximal Ideals; Quotient Rings; Fields; Field Extensions; Finite Fields; Applications.

**Grading:** Your grade is determined by a syllabus quiz, paper-and-pencil homework assignments, a midterm, and a final. There may also be some extra credit based on participation in lecture.

The course will be graded as follows

- Syllabus Quiz 3%
- Homework 42%
- Midterm 25%
- Final 30%

Your grade in the course *will not be harder than:*

A-/A 90% - 100%, B-/B/B+ 80% - 89.9%, C-/C/C+ 70% - 79.9%, D-/D/D+ 60%-69.9%, F 0%-59.9%.

**Course Specific Learning Outcomes:** A successful student in Math 343 will be able to:

1. State the basic definitions of groups, subgroups and group homomorphisms.
2. Derive basic properties of groups, subgroups and group homomorphisms.
3. Calculate and use the order of elements in groups.
4. Identify normal subgroups and their connection with quotient groups.
5. Apply the First Isomorphism Theorem for groups.
6. State the basic definitions and derive basic properties of fields, rings, subrings and ring homomorphisms.
7. State the definition of an ideal and recognize its connection with quotient rings.

**Student Conduct Code:** Students are expected to be familiar with Oregon State University's Expectations for Student Conduct. Please review these at the following web link:

<http://studentlife.oregonstate.edu/code>

**Students With Disabilities:** Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at <http://ds.oregonstate.edu>. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

**Syllabus Quiz:** A short (canvas) quiz testing your knowledge of this syllabus will be available during weeks 0 and 1. It's due on Sunday, Sept. 30th.

**Exams:** There will be one midterm and a cumulative final exam. Calculators and/or notes are **NOT** allowed. The final does **NOT** replace the midterm. Tests are not allowed to be made-up unless the circumstances are truly exceptional and contact requesting the accommodation is made **PRIOR** to the test.

- Midterm: Monday, Feb. 11th during our regularly scheduled lecture (in Strand 162)
- Final Exam: Wednesday, March 20th, 12-1:50 PM (in Strand 162)

**Homework:** Each homework assignment will be available on the course web page at least one week before they are due in-class (due dates shown on tentative calendar). Late homework will never be accepted. If for some reason you have to miss a class on a day homework is due, you may scan and e-mail me your assignment (by when the class ends, 12 PM). If you send me something other than a single PDF file your homework may not be accepted. No pictures please

**Extra Credit – Lecture Participation:** There may be up to a maximum of 5% of extra credit available in lecture. This will consist of up to 5 pop-discussion quizzes (at 1% each, where you can discuss the problems with your fellow students) given during some of the lectures. There may be less than 5 of these!

**Course (Tentative) Calendar:**

	Monday	Tuesday	Wednesday	Thursday	Friday
Week					
1	The dihedral group, $D_8$		Binary structures		Groups
2	Groups		Subgroups		Subgroups (HW 1 due)
3	<b>MLK JR DAY</b>		Isomorphisms		Alternating Group
4	Cosets		Homomorphisms		Homomorphisms (HW 2 due)
5	Normal Subgroups		Quotient Groups		Review (HW 3 due)
6	Midterm		Rings		Rings
7	Rings		Ring Homomorphisms		Ideals (HW 4 due)
8	Ideals		Quotient Rings		Extension Fields
9	Extension Fields		Extension Fields		Finite Fields (HW 5 due)
10	Finite Fields		Finite Fields		Review (HW 6 due)

Notes: Syllabus Quiz due Sun. 1/20/19. Final on Wed. March 20th at noon. Holidays in **bold**