Instructor: Javid Validashti  
Department of Mathematics  
Cleveland State University  

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Office hours: Thursdays 1:00–1:50 pm, Tuesdays 6:00–6:50, or by appointment

Course Information:  
Class time: Tuesdays & Thursdays 4:30-5:45  
Location: MC332  
Prerequisite: A grade of C or better in MTH 220 and MTH 288 or permission from the instructor.

Course Description: An introduction to modern abstract algebra, concentrating on modular arithmetic and beginning of group theory, including groups of symmetries, classification of finite abelian groups, group actions and applications. In this course, you will be introduced to many new definitions and concepts, most of them are rather abstract. When you learn them, please pay particular attention to concrete examples. Memorizing definitions without being able to handle examples will not be helpful. There will be some computation, but mostly proofs. You will see them every class, you will read them in the textbook, you will write them in your homework. This will help you learn to think and express yourselves mathematically and to improve your mathematical writing and oral presentation skills.

Topics:

- 0.3 Division and Euclidean Algorithms
- 0.3 Fundamental Theorem of Arithmetic
- 0.3 Integers mod $n$
- 0.3 Fermat’s Little Theorem
- 0.4 Complex Numbers
- 0.5 Matrices
- 1.1 Groups: Examples and Basic Concepts
- 1.2 Subgroups
- 1.3 Cyclic Groups
- 1.4 Permutations
- 1.4 Alternating group $A_n$
- 2.1 Cosets and Lagrange’s Theorem
- 2.1 Applications
2.2 Group Homomorphisms
2.3 Normal Subgroups
2.4 Quotient Groups
3.1 Abelian Groups: Examples and Definitions
3.2 Computing Orders
3.4 Fundamental Theorem of Finite Abelian Groups
4.1 Group Actions and Cayley’s Theorem
4.2 Stabilizers and Orbits in a Group Action
4.3 Burnside’s Theorem and Applications

**Exams:** There will be two midterm exams during the semester in addition to the final exam. No electronic devices are allowed for exams and quizzes. Please bring your CSU ID for all exams. Grades will be posted after each exam on Blackboard. There will be a review session before each exam, please refer to the weekly class schedule below. Grade appeal requests must be submitted to me immediately after receiving graded exams back in class.

- Exam I, Thursday, Feb 26, during the regular class time & location, up to section 1.4
- Exam II, Thursday, April 9, during the regular class time & location, up to section 3.2
- Final Exam, Tuesday, May 5, 4:00-6:00pm, at the usual classroom, cumulative.

**Make-up Exam Policy:** No conflict or makeup exams except for extreme medical conditions or 3 regularly scheduled finals in a 24 hour period. Make-up exams may only given for exceptional circumstances, and the need for a makeup midterm must be made BEFORE the exam is given. Once a midterm has been given, short of a medical emergency on the way to the exam, a makeup exam will NOT be provided. To be eligible for a make-up exam, you must present an acceptable and documented excuse such as attending a university-sponsored activity (conference, competition, etc.), or doctor’s note clearly indicating that you can not take the test on the scheduled date.

**Homework:** Doing the homework is essential to understanding the material. Homework may be assigned every lecture and will be collected every Thursday at the beginning of class. No late homework will be accepted, but 3 missed assignments will be dropped automatically.

- Staple the homework papers for each due date, otherwise it will not be graded.
- Print your name, date and course number clearly on top of the first page. Do not include your ID#.
- You are permitted, even encouraged, to work together on homework, but each student must write their solutions independently.
- You must show your work and express your methodology clearly for each problem. I am interested in your thinking, explanations, and the logical flow of your work, as much as your numerical correctness. You need to put in enough detail for the reader to follow your logic easily.
• If you are writing by hand, please leave large margins and space between problems free for corrections and comments. Write legibly. If you are typing, you should use a 12 point font with 1 inch margins.

• A few problems from each assignment may be graded randomly. If a problem is worth 5 points, then the breakdown will be:
  – 1 point for stating the problem at the beginning.
  – 2 points for correct reasoning leading to a correct solution.
  – 2 points for clarity and neatness.

• I strongly suggest that you retain all graded work from the course until the end of the semester and final grades are posted. This way if a discrepancy arises between a recorded grade and the actual grade, we have the actual document to examine in order to rectify the situation. Also graded works make for excellent study materials for upcoming exams.

Grading: The final grade will be determined as follows and will posted on Blackboard.

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General Policies:

• For privacy concerns, please do not send me emails for questions concerning your homework and exam grades, see me during my office hours.

• Use your University e-mail address for course-related correspondences with me. Please keep your emails to me short and on target.

• Please do not come in the classroom more than 5 minutes late without my permission. If you have a valid reason to be late, please enter without disrupting the class.

Tips for Success:

• Come to class awake and in a good mood!

• Read the textbook before class to have an idea about upcoming lectures.

• Be involved and enthusiastic about learning.

• Do the homework assignments ASAP after each lecture. Do not postpone them to the night before the due date.

• Spend some time soon after class on reading the class notes and digesting the ideas and methods covered in the lecture.
• Find friends in class and talk to them about the concepts and ideas covered in class and discuss the homework problems with them.

• Do additional problems similar to the homework assignments. Read other textbooks for this course.

• Do not miss many classes, and don’t overlook the content of missed lectures. In a math course, future lectures heavily rely on the materials covered before.

• Do the review problems before the exams.

• Give me some feedback about the class.

Tentative Course Schedule:

• Week 1 (1/13-1/15): Introduction, 0.3 Division and Euclidean Algorithms

• Week 2 (1/20-1/22): 0.3 Fundamental Theorem of Arithmetic, 0.3 Integers mod n

• Week 3 (1/27-1/29): 0.3 Fermat’s Little Theorem, 0.4 Complex Numbers

• Week 4 (2/3-2/5): 0.5 Matrices, 1.1 Groups: Examples and Basic Concepts

• Week 5 (2/10-2/12): 1.2 Subgroups, 1.3 Cyclic Groups

• Week 6 (2/17-2/19): 1.4 Permutations, 1.4 Alternating group $A_n$

• Week 7: (2/24) Review Exam I, (2/26) Exam I

• Week 8 (3/3-3/5): 2.1 Cosets and Lagrange’s Theorem, 2.1 Applications

• Week 9: Spring Break

• Week 10 (3/17-3/19): 2.2 Group Homomorphisms

• Week 11 (3/24-3/26): 2.3 Normal Subgroups, 2.4 Quotient Groups

• Week 12 (3/31-4/2): 3.1 Abelian Groups: Examples and Definitions, 3.2 Computing Orders

• Week 13: (4/7), Review Exam II, (4/9) Exam II

• Week 14 (4/14-4/16): 3.4 Fundamental Theorem of Finite Abelian Groups

• Week 15 (4/21-4/23): 4.1 Group Actions and Cayley’s Theorem, 4.2 Stabilizers and Orbits in a Group Action

• Week 16 (4/28-4/30): 4.3 Burnside’s Theorem and Applications, Final Exam Review

• Final Exam, Tuesday, May 5, 4:00-6:00pm, at the usual classroom, cumulative.

Recources: Our course is a Writing Across the Curriculum course. The university Writing Center offers individual help, runs workshops, and provide other resources to help you with writing. For information go to http://www.csuohio.edu/academic/writingcenter/WAC. For general academic help the Focus Center (UC 563, 687-5114) runs workshops about time management, test taking skills, study skills, etc.

Accommodations for students with disabilities: CSU provides classroom accommodations, auxiliary aids and services to ensure equal educational opportunities for all students regardless of their disability. For more information contact the Office of Disability Services at 216-687-2015. Accommodations need to be requested in advance and will not be granted retroactively.