

# Math 425 - Modern Algebra

## Fall 2015

### Basic Information:

Instructor: Dr. Nathan Reff  
 Email: [nreff@brockport.edu](mailto:nreff@brockport.edu)  
 Office: Albert W. **Brown** Building: **297**  
 Phone: (585) 395-5675  
 Office Hours: MW 8:00AM-9:00AM, 5:00PM-6:00PM,  
 or by appointment, or see if I am in!  
 Course Web Page: <http://www.acs.brockport.edu/~nreff/MTH425/>  
 Course Meetings: MWF 9:05AM-9:55AM in Holmes 203  
 Text: *Abstract Algebra: Theory and Applications, 2015 Ed., by Thomas Judson*  
 .pdf version here: <http://abstract.ups.edu/download/aata-20150812.pdf>  
 Browser version here: <http://abstract.ups.edu/aata/>

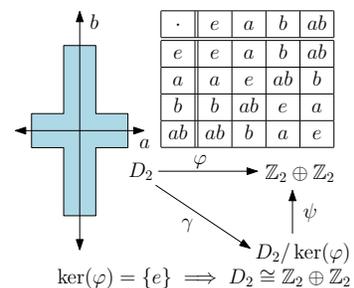


### INFORMATION ABOUT THIS COURSE:

**Prerequisite:** Calculus III (MTH 203) and Linear Algebra (MTH 324). This course is proof intensive, so please see me as soon as possible if you are concerned about your background.

**Course Catalog Description:** *Provides a study of algebraic systems, with special attention to groups and their classification properties. Emphasizes theory and proofs, but clarifies the ideas by means of specific examples involving modular arithmetic, real and complex numbers, permutations, and matrices.*

**Student Learning Outcomes:** The major focus of this course is the study of groups. This algebraic structure has three historical roots which connect the theory of algebraic equations, number theory and geometry. Due to this, groups have a wide range of applications in modern research and technology. For example, groups are fundamentally connected with symmetry, and are capable of encoding the symmetries of a geometric figure in a way that is now essential for chemists and physicists. Other applications to various topics will also be mentioned throughout the course. If time permits, we will also study rings and other algebraic structures.



After completing this course students should:

- Understand the definitions and various properties of groups and other algebraic structures.
- Be proficient at writing proofs and understand any proof presented throughout the course.
- Be able to classify specific properties a group and its elements have.
- Be able to construct new groups from old; e.g., subgroups, direct products, quotients, etc.
- Be able to construct, understand and use homomorphisms, isomorphisms and automorphisms.
- Be able to make conjectures, reason abstractly and hone their mathematical creativity.
- Be able to communicate their arguments clearly, accept and give criticism, and work together to produce correct proofs.

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| <b>HOW YOUR GRADE WILL BE DETERMINED:</b> |
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**Grade Distribution:** Your final grade will be determined as follows:

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| Homework and participation | 25% |
| Exam 1                     | 15% |
| Exam 2                     | 15% |
| Exam 3                     | 15% |
| Comprehensive Final Exam   | 30% |

Participation points can be earned by answering questions, asking relevant questions, working well with others, etc. Coming to class is expected and will not get you these participation points. I would like everyone to be a part of the classroom discussions.

Borderline grades can be adjusted up or down based on your attendance, class participation, homework, and trends. For example, a pattern of steady improvement is good, but a weak final exam is bad.

If at any time you think there is an error in your computed grade on an assignment please bring this to my attention the day the work is returned to you.

Opportunities to earn additional course credit include participating/presenting a mathematically related topic (at the Discrete Math Seminar, MAA Seaway Section Conference, Scholars Day, etc.), or participation and recognition in a math competition (Virginia Tech Math Exam, Putnam Exam, Dick Mahoney, Integration Bee, UofR Math Competition, etc.). Please let me know if you are interested in any other mathematically themed activity outside of class.

**Grade Conversion:**

|    |        |    |       |    |       |    |       |
|----|--------|----|-------|----|-------|----|-------|
| A  | 93–100 | B  | 83–86 | C  | 73–76 | D  | 63–66 |
| A– | 90–92  | B– | 80–82 | C– | 70–72 | D– | 60–62 |
| B+ | 87–89  | C+ | 77–79 | D+ | 67–69 | E  | 0–59  |

Please see the Mathematics Department Guidelines for Student Evaluation here: [http://www.brockport.edu/math/MATH\\_DEPT\\_GUIDELINES\\_FOR\\_STUDENT\\_EVALUATION.pdf](http://www.brockport.edu/math/MATH_DEPT_GUIDELINES_FOR_STUDENT_EVALUATION.pdf).

**Homework:** Homework problems will be posted

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| <b>on the course website:</b> <a href="http://www.acs.brockport.edu/~nreff/MTH425/">http://www.acs.brockport.edu/~nreff/MTH425/</a> . |
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Most homework problems will come right out of the textbook, but I will also create additional problems and assignments. You must complete all of these problems and bring your solutions to each lecture. Every week you will turn in problems to be graded. Other than assigned problems, reading will be a part of your daily homework.

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| <b>No late homework will be accepted!</b> |
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Please make sure your homework is *neat* (legible, not torn out of a spiral bound notebook, etc.) and *stapled* when you turn it in. Treat your homework as if it is a professional document that you would submit in a future workplace. It is *very* important that you keep working on problems throughout the course. There is an old saying that “math is not a spectator sport” and there is definitely a lot of truth to this. I recommend working individually and also with other classmates (but make sure you are turning in your own work!). If you are working on a

problem and get stuck, make a note of it, bring your work and ask questions. I encourage *everyone* to come to office hours!

**Group work:** In addition to completing homework assignments on your own, I highly encourage you to collaborate in small groups to solve, write, and hopefully present a portion of the homework problems. Each member of a group should have a rotating designated role. Here are some suggested roles:

1. **Group Manager:** In addition to helping solve the problems, this person will coordinate the group schedule of when to collaborate (either in person, google, skype, etc.). The group manager is also in charge of making sure the assignment is completed in a timely fashion and contacting me if there are any questions. The group manager should also assist in editing and making sure what will be presented is correct. Encourage everyone in your group!
2. **Scribe:** In addition to helping solve the problems, this person will write the final solutions neatly. Each solution should be on its own page with the problem written out on the top of the page followed by the solution. The reason for this is so we can use the camera projector to see the work without having to write the solutions on the board. After the presentation, the scribe will edit the solutions and write a final version for the group to study from, but may also be submitted so the entire class can see it. The scribe will work with the other group members on this final editing process.
3. **Presenter:** In addition to helping solve the problems, this person will walk the class through the group's solutions and answer any questions others students or I have. The presenter can have the group help during class, but should definitely be leading the discussions. Before presenting, the group (especially the manager) should work together to make sure the presenter is prepared. The presenter should also assist in editing the final version of the solutions after presenting.

**Tests:** There will be 3 exams during the semester. The tentative test dates are as follows:

- Exam 1    September 25    (The **course drop deadline** is September 29, 5PM).
- Exam 2    October 30        (The **course withdraw deadline** is November 6, 5PM).
- Exam 3    December 4.

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| <b>COURSE ETIQUETTE, POLICIES AND ADDITIONAL RESOURCES:</b> |
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**Classroom Etiquette:** Please turn off cell phones, laptops and other electronic devices during class.

**Exam Policy:** No calculators, cell phones, computers, mp3 players, slide rules, abaci, Addiators, Napier's bones, Difference/Analytical Engines, Pascalinas, Antikythera mechanisms, etc. may be used. In other words I want you to only use your brain and the hard work you put into this course to earn your grade. You may not talk to each other in the classroom while other students are working, even if you are done. Please keep your eyes on your own paper. Do not look at notes, books, etc. while working. Work through the problem on your own and you will

do fine (and save us both a lot of trouble).

**Academic Integrity:** Academic dishonesty of any kind will not be tolerated. It is disrespectful to the College, your classmates and to me. Any form of academic dishonesty will be dealt with severely. The College at Brockport: SUNY Policy on Academic Dishonesty (675 The Policy on Student Academic Dishonesty) can be found at <http://www.brockport.edu/hr/resources/chapters/675policystudentacademicdishonesty.htm>.

**Excused Absences:** As outlined in The College at Brockport: SUNY Attendance Policy absences will be excused for (a) documented illnesses, (b) official representation of the College, (c) death of a close relative, (d) religious holiday, and (e) other circumstances beyond the control of the student. Excuses for official representation of the College must be obtained from the official supervising that activity or event. Students whose unexcused absences exceed 15 percent of the scheduled classes and laboratories may receive a lowered grade or failure at the instructor's discretion. The full policy can be found here: [http://www.brockport.edu/policies/docs/attendance\\_policy.pdf](http://www.brockport.edu/policies/docs/attendance_policy.pdf)

If you cannot attend one of the exams you should submit a written reason for your absence **in advance** of the exam date. I would appreciate knowing at least 3 days in advance if you are going to miss a class. In emergency situations please send me an email as soon as possible. The decision to allow make-up exams will be made on a case by case basis, but proper documentation is always necessary. No make-up exams will be given without advance notice (unless it is an emergency). If you miss an exam or final with an unexcused absence, you will receive a 0 for that particular assignment.

**Attendance Policy:** You are expected to attend and be a part of every class meeting. I will keep a record of your attendance, participation and preparation. Excessive absences will noticeably affect your final grade (as mentioned in the excused absences section above). This course will move rather quickly so I suggest you only miss class for a good reason (meaning an excused absence).

**Disability Statement:** Students with documented disabilities may be entitled to specific accommodations. The College at Brockport's Office for Student with Disabilities (OSD) makes this determination. Please contact the Office for Students with Disabilities at (585) 395-5409 or [osdoffic@brockport.edu](mailto:osdoffic@brockport.edu) to inquire about obtaining an official letter to the course instructors detailing any approved accommodations.

The student is responsible for providing the course instructors with this official letter. Faculty work as a team with the Office for Students with Disabilities to meet the needs of students with disabilities.

**Title IX compliance statement:** Gender discrimination and sexual harassment are prohibited in class. Title IX legislation requires the College to provide gender equity in all areas of campus life. If you or someone you know has experienced gender discrimination, sexual harassment, or sexual assault, we encourage you to seek assistance and to report the incident through resources available at [www.brockport.edu/titleix/index.html](http://www.brockport.edu/titleix/index.html). Confidential assistance is available at Hazen Center for Integrated Care. For these and other regulations governing campus life, please see all of our Student Policies at [www.brockport.edu/policies/index.php](http://www.brockport.edu/policies/index.php).

**Disclaimer:** I reserve the right to make changes to this syllabus without prior notice.