

Policies

Attendance: Your engagement and participation in class activities is important. Please try to notify your instructor in advance of any planned absences.

Basic Needs: Any student who faces challenges securing food, housing, or other basic needs and believes this may affect their performance in this course is urged to contact Ms. Denine Rocco, Dean of Students (508-531-1276 drocco@bridgew.edu). Please also notify your instructor if you are comfortable doing so.

Collaboration: Working collaboratively with your classmates is highly encouraged. However, the work you hand in on individual assignments must be your own. Collaboration on assignments which do not permit collaboration will constitute a violation of the BSU Policy on Academic Integrity.

Coupons: Every student begins with eight (8) coupons redeemable for additional revisions, see pp. 2-3.

Disability Resources: In compliance with BSU policy and equal access law, your instructor is available to discuss appropriate accommodations you may require as a student with a disability. Requests for academic accommodation must be made during the add/drop period. Students are encouraged to register with the Disability Resources Office (Academic Achievement Center, Maxwell Library) for determination of reasonable accommodations.

Homework and Revision: No revision will be given to a student without the instructor first reviewing their progress on relevant homework. Bring your homework to each appointment.

Tutoring: Your fellow students, study groups, math department study hours in DMF 461, and your instructor are the best resources beyond the classroom.

Learning Plan for Our Course

Dates listed subject to change. Chapters reference both [J] and [G].

		<i>Mastery problems are embedded in quizzes and exams and denoted by an M.</i>		<i>Earn two (2) to master a chapter.</i>		
	Ch.	Mastery Goal	Quizzes/Exams			
W 9/5	0	Write soundly-structured proofs of implications and set arguments; Perform computations with modular arithmetic .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F 9/7						
M 9/10						
W 9/12	1	Use Cayley tables to study operations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F 9/14	2	Apply the definition of a group to distinguish groups from other types of algebraic structures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M 9/17						
W 9/19						
F 9/21	3	Determine the orders of finite groups and of their elements; Apply definitions and tests to distinguish subgroups from mere subsets of a group.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M 9/24						
W 9/26						
F 9/28						
M 10/1	4	Identify generators for, and use properties to distinguish, cyclic groups .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
W 10/3						
F 10/5						
M 10/8	No Class					
W 10/10	Exam 1, in class; Portfolio evaluation 1					
F 10/12	5	Compute with, identify order of, and use several notations to express, elements of permutation groups .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M 10/15						
W 10/17						
F 10/19	6	Use the definition to distinguish whether a group function is an isomorphism .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M 10/22						
W 10/24						
F 10/26	7	Use cosets of a subgroup to partition the group; Infer orders of (sub)groups from Lagrange's Theorem .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M 10/29						
W 10/31						
F 11/2	8	Compare and contrast the structure of direct products of groups with that of other known groups.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M 11/5						
W 11/7						
F 11/9						
M 11/12	No Class					
W 11/14	Exam 2, in class; Portfolio evaluation 2					
F 11/16	9	Use the definition and theorems to distinguish normal subgroups from non-normal subgroups; Compare and contrast the structure of factor groups with that of other known groups.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M 11/19						
W 11/21						
F 11/23			No			
M 11/26	10	Apply one or more isomorphism theorems to construct and characterize new groups from old.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
W 11/28						
F 11/30						
M 12/3	11	Classify abelian groups of a given order using the fundamental theorem .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
W 12/5						
F 12/7						
M 12/10	Exam 3 take-home due; Portfolio evaluation 3					
W 12/12	Review, in class					
F 12/14	Final Exam, 11:00 – 1:00					

The final exam will include a mastery problem from each chapter. Your final exam performance is also a component of your plus/minus modifier (p.3).

Abstract Algebra I



MATH 301-002

Fall 2018

MWF 11:15–12:05

DMF 467

What You'll Learn

- Identify fundamental structures and substructures in abstract algebra, particularly groups and their subgroups, and their properties.
- Construct new groups from old, and use homomorphisms to compare and contrast groups.
- Discover and communicate mathematical proofs with clarity and precision.

How You'll Learn It

Abstract algebra is a subtle subject that takes time to master. Our *standards-based grading* gives you several opportunities to show how your understanding of each topic is improving over time, letting you focus more on learning goals than on performance tasks.

You Should Know

Find course mastery standards, policies, important dates, and other information here.

Dr. Matt Salomone

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 » bsumath301.slack.com
 DMF Science, Room 433
 Office Hours:
 Web: matthematics.com



Get Into the Group.

Is there mathematics beyond numbers?

What if the numbers and equations you grew up studying in all your math classes were just special cases — specific variations on a more general theme? If high-school algebra was a tree, what does the whole forest look like? And what gives the trees in that forest both life and kinship with one another?

Abstract algebra is the study of mathematical structures with the power to unify across contexts. In this first semester, those structures are called **groups**. Beginning from a surprisingly simple definition, we'll see how the theory of groups gives us tools to understand not only the arithmetic and algebra of numbers but also geometry, combinatorics, codes, and much more.

Linear Algebra (MATH 202) is prerequisite for this course.

Progress, Not Points: Our Grading Specifications

Here are the learning activities of our course, and the specifications to which each is assessed.

Making the Grade: Your Progress Chart

Check off your progress in each learning area from left to right on this chart.

Mastering mathematics requires a significant investment of time and struggle. Our grading system gives many opportunities to show what you know. It's most important that you learn, not when you learn!	Does the work demonstrate understanding of the concept & meet expectations?				Learning Progress, Attainment, & Engagement: "The Bundle"				Plus/Minus Modifier C- needed for prereq/transfer		
	YES — Full Mark <input checked="" type="checkbox"/> Is it complete & well communicated?		NO — No Mark Yet <input type="checkbox"/> Is there evidence of partial understanding?		To complete a bundle, check every box in its column. No partial credit is awarded. No box may be checked unless all boxes to its left are checked.						
	YES Exemplary	NO Satisfactory	YES Progressing	NO Not Assessed	Kinds of learning and thinking tasks	Beginner D	Intermediate C	Advanced B	Master A		
Document Your Success: Submit a proof portfolio of selected proofs written both as individual and as group. » Individual proofs are assessed:	Full marks (E/S) on a majority of assigned proofs, with more E than S. <i>Complete, correct, carefully supported, and typeset; all without gaps/errors.</i>	Full marks (E/S) on one-third of assigned proofs, and at least one E. <i>Correct reasoning and support overall, small errors in logic, writing, notation.</i>	Full marks (E/S) on one-fourth of assigned proofs. <i>Revise. Partial understanding, but significant errors warrant revision.</i>	<i>Revise with coupon. One per revision per proof after due date.</i>	Conjecture, Critique Create, (Dis-)Prove		P <input type="checkbox"/>	S <input type="checkbox"/>	E <input type="checkbox"/>	Plus (+) <input type="checkbox"/> & <input type="checkbox"/> 80+ XP 80%+ final exam Base (no +/-) <input type="checkbox"/> & <input type="checkbox"/> 50+ XP 50%+ final exam Minus (-) if criteria for base grade above are not met, OR * if A bundle completed without an E on any exam	
Connect Ideas: Integrate course material across chapters via exams . » Individual sections of exams are assessed:	Full marks (E/S) on every section of the exam, with at least one earning an E. <i>All work is well written, logically and specifically supported, and free of all but the most trivial errors.</i>	Full marks (E/S) on every section of the exam. <i>All work is supported and easy to read; errors in logic/computation do not diminish the arguments made.</i>	Honest attempts on all sections, with one or more earning no mark (P/N). <i>Revise. All problems attempted. Solutions show partial understanding but logic/computation errors diminish the arguments.</i>	<i>Revise with coupon. Significant portions omitted or inconsequential; cannot assess for understanding.</i>	Deduce, Contrast Compare, Relate	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		*At least one E in this row also needed to earn an A grade
Build Mastery: Demonstrate foundational knowledge and skills through selected quiz and exam problems. One <input checked="" type="checkbox"/> in this row is earned by Two <input checked="" type="checkbox"/> in same chapter on p. 4.		All problems are attempted, and at least 80% are correct. Any computations are well supported.	Revise. One or more problems blank, or less than 80% correct, or has computations without support.		Apply, Construct Identify, Explain	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
Acquaint Yourself: These pre-class warm-ups walk you through introductory material to prepare you for in-class problem solving.		An effort was made in good faith to respond to all questions in a relevant fashion, submitted on time.		One or more responses missing, irrelevant, or inconsequential; or, submission was not received on time.	Understand, Illustrate Recite, Remember	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		

Revisions on quizzes and exam sections are given during office hours. Request a 30-minute appointment by visiting the #drsoffice board in Slack. **Subject to review of homework.** Maximum one (1) revision per week, or two (2) with a coupon.

Experience Points (XP) are awarded for completing various tasks that enhance your and your classmates' learning environment.

Course Resources

This course makes use of Open Educational Resources.

Course Website: mathematics.com/abstract

Required Text: [J] Judson, T. *Abstract Algebra: Theory and Applications*. CC-BY licensed; remixed on course website. Author's original at abstract.ups.edu.

Recommended Text: [G] Gallian, J. *Contemporary Abstract Algebra* 9th Edition. Cengage. ISBN 1-305-65796-9. Recommended for students planning advanced study.

Online Accounts: Some free online tools are used in this course; see the course website for details on getting signed up and started.