

Group Theory - CRN 14053 - MATH 3175 - 02, 9:15 am - 10:20 am MWR Kariotis Hall 202
Group Theory - CRN 14834 - MATH 3175 - 03, 10:30 am - 11:35 am MWR Kariotis Hall 005

Instructor:

Gordana Todorov
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Office Hours: M 11:45-12:15, W12-3pm and by appointment

Textbook:

Abstract Algebra, 3rd edition, by John A. Beachy and William D. Blair, 2006, Waveland Press, Inc (Long Grove Illinois), ISBN 13 digit 978-1-57766-443-7.

Information about the course:

I will be posting information about the course on my web page <http://www.northeastern.edu/gtodorov/>

Course Description:

The course presents basic concepts and techniques of the group theory: symmetry groups, axiomatic definition of groups, important classes of groups (abelian, cyclic, additive and multiplicative groups of residues, permutation groups), Cayley table, subgroups, group homomorphisms, cosets, the Lagrange theorem, normal subgroups, quotient groups, direct products. Studies structural properties of groups. Possible applications include geometry, number theory, crystallography, physics, and combinatorics.

Grading Policies:

There will be 6 quizzes. You will be allowed to drop your lowest quiz grade. Your grade is computed as: 60% in-class quizzes, 40% final exam. Course letter grades require the following minimum percent grades: A (95%), A-(90%), B+(86.7%), B(83.4%), B-(80%), C+(76.7%), C(73.4%), C-(70%), D+(66.7%), D(63.4%), D-(60%)

Drop, Incomplete:

The last day to drop a course without receiving a W grade is September 28. The last date to drop a class with a W grade is December 5 (reading day). As a matter of Math Department policy: The I grade (incomplete) will be given only rarely. It is intended to cover emergency situations in which a student who is doing reasonably well (C- or better) is unable, due to circumstances beyond the students control, to complete all course requirements (e.g., is unable to take the final exam due to hospitalization). It requires a written agreement with the instructor as to how to make up the missing work. An incomplete may not be used to rescue a failing grade.

Course Policies:

1. You are responsible for ALL information and announcements given in the class even if you were absent.
2. If you must leave class early, please, see me before class.
3. All cell-phones should be turned off in order to pay full attention to the discussions in the class. If you are expecting important phone call, please, let me know before the class.
4. It is University policy that no grade, including an incomplete, can be changed after one year. Exceptions must be authorized by the Academic Standing Committee.
5. All students without legitimate conflicts (approved by the instructor) should take the final exam at the scheduled time. Please, do not make travel plans that conflict with the final exam: Friday Dec.7 - Friday Dec.14, 2018.

About the course and you!

This is a very beautiful course, with a lot of theory together with both examples and strict proofs. You will be expected to write proper mathematical proofs!

You are expected to do a lot of work in this course!

You are expected to do HW regularly. HW will be discussed at the beginning of each class.

PLEASE REMEMBER, YOUR SUCCESS DEPENDS ON YOUR WORK!!!

Issues with the Course/Instructor:

If you have a concern about the course or the instructor that is not or cannot be solved by speaking with the instructor, please contact the Mathematics Department Teaching Director, Professor Robert McOwen, 445 Lake Hall, x-5678 r.mcowen(at)northeastern.edu.

Tutoring:

<http://www.math.neu.edu/undergraduate-program/mathematics-tutoring-services> available Room 540B Nightingale, sign up on your myneu account (tutoring link). I will identify some tutors at the Math Department tutoring center with experience in group theory. For College of Sciences peer tutoring see www.northeastern.edu/csastutoring/

Academic Honesty:

The University's policies on cheating and related disciplinary actions are detailed in the Student Handbook. Incidents of cheating will be reported to the Office of Judicial Affairs. These incidents are investigated and adjudicated. The judicial process is a fair one with procedures for appealing decisions, and leads to substantial consequences: a deferred suspension and a fine of up to \$200 for the first offense, expulsion from the University for a second offense.

TRACE:

At the end of the semester you are expected to fill in the TRACE evaluation form.

Some Additional Resources:

J. L.Alperin and Rowen B. Bell: Groups and Representations, Springer GTM #162
(good quick review and sequel text)

Mark A. Armstrong, Groups and Symmetry, Springer UTM ISBN-13: 978-0387966755. Emphasizes geometry, symmetry and matrix groups. Used as text in Fall, 2016.

GAP: software for working with groups <http://www.gap-system.org/sitemap.html>

(Prof. Gene Cooperman of CCIS at NU is one of the many authors. He and D. Kunkle wrote a program for fast solutions of Rubiks cube <http://www.ccs.neu.edu/home/kunkle/papers/kunkle-issac07.pdf>).

Class Schedule (tentative)

Day	Date	Class	Section	HW
W	Sept.5	#1	1.1 Divisors 1.2 Primes	p13: #3, 5, 10 p22: #1, 8, 10, 11
Th	Sept.6	#2	1.3 Congruences 1.4 Integers modulo n	p32: #3, 15, 19, 26 p43: #1, 2, 3, 9, 13, 14, 19, 29
M	Sept.10	#3	2.1 Functions	p59: #2, 5,15, 16, 18
W	Sept.12	#4	2.3 Permutations and Practice Quiz 1	p84: #1, 2 a, e (from Exercise 1), 4 a, 6, 10, 11, 14, 15
Th	Sept.13	#5	Quiz 1 & 2.3 Permutations	p112
M	Sept.17	#6	3.1 Definition of a group	p100: #1,2,3,4,5,6,7,8, 10, 11, 13, 14, 15, 17, 22, 23, 24
W	Sept.19	#7	3.2 Subgroups and Practice Quiz 2	p112: #1, 3, 5a,b, 7, 11, 12, 14, 15, 16, 19, 21, 22, 26, 27
Th	Sept.20	#8	3.3 Examples	p123: #1, 2, 6, 7, 8, 9,14, 18
M	Sept.24	#9	3.4 Isomorphisms	p132: #1, 2, 4, 6, 8, 10, 13,17, 19, 20, 26, 27, 28.
W	Sept.26	#10	3.4 Isomorphisms	p132
Th	Sept.27	#11	Quiz 2 & 3.5 Cyclic Groups	p140: #2, 3, 5, 6, 10, 12, 16, 19, 20.
M	Oct.1	#12	3.5 Cyclic Groups	p140
W	Oct.3	#13	3.6 Permutation Groups	p150: #1, 6, 7, 8, 9, 16, 17, 19, 20, 23, 27.
Th	Oct.4	#14	3.6 Permutation Groups	p150
M	Oct.8	-	No classes	
W	Oct.11	#15	3.7 Homomorphisms	p162: #3, 4, 5, 7, 8,12,14, 15, 18, 19.
Th	Oct.11	#16	Quiz 3 & 3.7 Homomorphisms	p162
M	Oct.15	#17	3.7 Homomorphisms	p162
W	Oct.17	#18	3.8 Normal Subgroups, Factor Groups	p175: #1, 2, 3, 5, 10, 12, 13,19, 20, 21.
Th	Oct.18	#19	3.8 Normal Subgroups, Factor Groups	p175
M	Oct.22	#20	3.8 Normal Subgroups, Factor Groups	p175
W	Oct.24	#21	7.1 Isom. Thms, Autom.	p321: #1, 2, 3, 4, 5, 8, 9, 10, 14, 15.
Th	Oct.25	#22	Quiz 4 & 7.1 Isom. Thms, Autom.	p321
M	Oct.29	#23	7.2 Conjugacy	p329: #1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 16, 17, 18
W	Oct.31	#24	7.2 Conjugacy	p329
Th	Nov.1	#25	7.3 Groups Acting on Sets	p336: #2*, 3, 4, 5, 6, 7, 8, 9, 11, 12.
M	Nov.5	#26	7.3 Groups Acting on Sets	p336
W	Nov.7	#27	7.4 Sylow theorems	p341: #1, 4, 6, 7, 8, 9, 10, 12, 14.
Th	Nov.8	#28	Quiz 5 & 7.4 Sylow theorems	p341
M	Nov.12	#29	7.4 Sylow theorems	p341
W	Nov.14	#30	7.5 Finite Abelian Groups	p348: #1, 2, 3a,b, 4a,b, 11, 12
Th	Nov.15	#31	7.5 Finite Abelian Groups	p348
M	Nov.19	#32	7.6 Solvable Groups	p356: #2, 3, 6, 7,12.
W	Nov.21	-	No classes	
Th	Nov.22	-	Thanksgiving - No classes	
M	Nov.26	#33	7.7 Simple Groups	p363: #1, 2, 3b, 6
W	Nov.28	#34	7.5 (Groups Small Order)	p349 #11, 12
Th	Nov.29	#35	Quiz 6 & 7.5 (Groups Small Order)	p349 #11, 12
M	Dec.3	#36	Review	
W	Dec.5	#37	Review	
Th	Dec.6		Reading day	
F-F	Dec.7-14		Final Exams	