

There are links to Practice Quizzes and Solutions to Practice Quizzes on page 3 (the Schedule of the course).

Group Theory - MATH 3175 01 - CRN 11858, 9:15 am - 10:20 am MWR, Richards Hall 160

Group Theory - MATH 3175 - 03 - CRN 14167, 10:30 am - 11:35 am MWR Richards Hall 160

Instructor: Gordana Todorov

Email: g.todorov@northeastern.edu, Office: 531 Lake Hall

Office Hours: M 1:30-2:30, W12-3pm and by appointment

TA for the course: Lei Yang

575 Lake Hall

Office Hours: M 2:50-3:50

Textbook:

Abstract Algebra, 4th edition, by John A. Beachy and William D. Blair, 2019, Waveland Press, Inc (Long Grove Illinois), ISBN 978-1-4786-3869-8

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 student's 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, let me know 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.

Conflict Final:

Only two finals at the same time or three in one day constitute a University recognized legitimate reason to be excused from taking the final at the scheduled time. Students with such a conflict should complete a final exam

conflict form, available on the registrar's website.

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 review, 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 Rubik's cube <http://www.ccs.neu.edu/home/kunkle/papers/kunkle-issac07.pdf>).

Important Dates:

Sep 4: First day of Fall 2019 classes

Sep 12: Last day of online class add for Fall classes

Sep 17: Last day to elect pass/fail for Fall classes (may be extended by instructor to October 25)

Sep 24: Last day to drop a Fall class without a W grade

Sep 27: Last day to file a Final Exam Conflict Form for Fall classes

Oct 14: Columbus Day observed, no classes

Nov 11: Veterans Day, no classes

Nov 27: First day of Thanksgiving recess, no classes

Dec 2: Classes resume

Dec 4: Last day of Fall classes

Dec 5: Last day to drop a Fall class with a W grade

Dec 6: First day of final exams for Fall classes

Dec 13: Last day of final exams for Fall classes

Dec 16: Faculty grade deadline at 2:00 PM for Fall classes

Dec 17: Grades for Fall classes on myNortheastern

Note: For additional information about the pass/fail system, go to <https://registrar.northeastern.edu/article/pass-fail-grading-system/>

Class Schedule (tentative)

Day	Date	Class	Section	HW
W	Sept.4	#1	1.1 Divisors	p13: #3, 5, 10
Th	Sept.5	#2	1.2 Primes 1.3 Congruences 1.4 Integers modulo n	p22: #1, 8, 10, 11 p32: #3, 15, 19, 26 p43: #1, 2, 3, 9, 13, 14, 19, 29
M	Sept.9	#3	2.1 Functions	p59: #2, 5,15, 16, 18
W	Sept.11	#4	2.3 Permutations and Practice Quiz 1	p84: #1, 2 a, e (from Exercise 1), 4 a, 6, 10,
Th	Sept.12	#5	Quiz 1 & 2.3 Permutations	p112
M	Sept.16	#6	3.1 Definition of a group	p100: #1,2,3,4,5,6,7,8, 10, 11, 13, 14, 15, 17,
W	Sept.18	#7	3.2 Subgroups	p112: #1, 3, 5a,b, 7, 11, 12, 14, 15, 16, 19, 21
Th	Sept.19	#8	3.3 Examples 3.4 Isomorphisms	p123: #1, 2, 6, 7, 8, 9,14, 18 p132: #1, 2, 4, 6, 8, 10, 13,17, 19, 20, 26, 27,
M	Sept.23	#9	3.4 Isomorphisms	p132: #1, 2, 4, 6, 8, 10, 13,17, 19, 20, 26, 27,
W	Sept.25	#10	3.5 Cyclic Groups	p140: #2, 3, 5, 6, 10, 12, 16, 19, 20.
Th	Sept.26	#11	3.5 Cyclic Groups	p140: #2, 3, 5, 6, 10, 12, 16, 19, 20.
M	Sept.30	#12	3.6 Permutation Groups	p150: #1, 6, 7, 8, 9, 16, 17, 19, 20, 23, 27.
W	Oct.2	#13	3.6 Permutation Groups	p150: #1, 6, 7, 8, 9, 16, 17, 19, 20, 23, 27.
Th	Oct.3	#14	3.7 Homomorphisms	p162: #3, 4, 5, 7, 8,12,14, 15, 18, 19
M	Oct.7	#15	3.7 Homomorphisms	p162: #3, 4, 5, 7, 8,12,14, 15, 18, 19
W	Oct.9	#16	Practice Quiz 2	Practice Quiz 2 Solutions
Th	Oct.10	#17	Quiz 2	
M	Oct.14	-	No classes	
W	Oct.16	#18	Practice Quiz 3	Practice Quiz 3 Solutions
Th	Oct.17	#19	Quiz 3	
M	Oct.21	#20	3.8 Normal Subgroups, Factor Groups	p175: #1, 2, 3, 5, 10, 12, 13,19, 20, 21.
W	Oct.23	#21	7.1 Isom. Thms, Autom.	p321: #1, 2, 3, 4, 5, 8, 9, 10, 14, 15.
Th	Oct.24	#22	& 7.1 Isom. Thms, Autom.	p321
M	Oct.28	#23	7.2 Conjugacy Practice Quiz 4	p329: #1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 16, 17
W	Oct.30	#24	7.2 Conjugacy Practice Quiz 4 Solutions	p329
Th	Oct.31	#25	Quiz 4 7.3 Groups Acting on Sets	p336: #2*, 3, 4, 5, 6, 7, 8, 9, 11, 12.
M	Nov.4	#26	7.3 Groups Acting on Sets	p336
W	Nov.6	#27	7.4.7.3 Groups Acting on Sets	p336: #2*, 3, 4, 5, 6, 7, 8, 9, 11, 12.
Th	Nov.7	#28	7.4 Sylow theorems	p341
M	Nov.11	no class	Practice Quiz 5	Practice Quiz 5 Solutions
W	Nov.13	#29	7.4 Sylow theorems	p341: #1, 4, 6, 7, 8, 9, 10, 12, 14.
Th	Nov.14	#30	Quiz 5 , 7.5 Finite Abelian Groups	p348: #1, 2, 3a,b, 4a,b, 11, 12
M	Nov.18	#31	7.5 Finite Abelian Groups, PracticeQuiz6	p348:#1,2,3a,b,4a,b,11,12, PracticeQuiz6So
W	Nov.20	#32	7.5 Groups Small Order	p349 #11, 12
Th	Nov.21	#33	Quiz 6	
M	Nov.25	#34	7.7 Simple Groups	p363: #1, 2, 3b, 6
W	Nov.27	-	No classes	
Th	Nov.28	-	Thanksgiving - No classes	
M	Dec.2	#35	Review F19FinalReview	F18MTH3175GroupTheoryFinal
W	Dec.4	#36	Review F18.final-exam-M	F16MTH3175GroupTheoryFinalPractic
Th	Dec.5		Reading day	
F	Dec.13		Final Exam 3:30-5:30pm - 409 Robinson Hall	