

MA796, Combinatorics of Coxeter groups, Nathan Reading-Fall 2017

Instructor	Nathan Reading
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Course website	http://www4.ncsu.edu/~nreadin/796 . You will be responsible for material on this site. You will be notified by email or in class when new information is posted on the site (except for regularly occurring changes like posting of assignments and solutions).
Class email list	A class email list will be established within the first few days of the class. You will be responsible for any information emailed to the list. In particular, you should check your "unity" email account roughly every day.
Class Sessions	Mondays and Wednesdays, 10:15-11:30 in 461 Riddick Hall.
Office hours	Mondays and Wednesdays, 11:45-12:15, or by appointment.
Course Description	This course will develop the theory of Coxeter groups. The beauty of Coxeter groups lies in the rich interplay between geometry, combinatorics and order/lattice theory. Most proofs about Coxeter groups exploit a combination of methods. The methods that play a role include the combinatorics of words, the geometry of arrangements of reflecting hyperplanes (or the geometry of root systems), order/lattice theory and linear algebra. We will begin our study with geometry, closely mixed with order/lattice theory, and progress towards an understanding of the combinatorics of <i>finite</i> Coxeter groups. With the geometric intuition in mind, we will proceed to study the more combinatorial aspects of (not necessarily finite) Coxeter groups. The main prerequisite for the course is abstract algebra (groups in particular) and some low-level linear algebra. Previous experience with combinatorics will be helpful, but will not be assumed. In particular, I will assume no previous experience with the combinatorics of words or with order/lattice theory.
Text	There will be one required text for the course and one optional text. Required: Bjorner and Brenti, Combinatorics of Coxeter groups Optional: Humphreys, Coxeter groups and reflection groups. These are both excellent books and should be on your desk if you want to work seriously with Coxeter groups. The required text covers the topics that we will focus on. The optional text develops the theory of Coxeter groups more fully and will particularly useful for the student who wants a more complete geometric treatment. There are also many other good books out there which cover Coxeter groups from different points of view. At some points during the course, I will work from some book chapters that I wrote. These will be provided to you in electronic form. I ask that you not distribute them.
Material Covered	Tentatively, we will cover Bjorner and Brenti Chapters 1-3 and parts of 4. Depending on time, we will supplement this with parts of Chapters 7 and 8 and possibly a very small amount of material from Humphreys. I will give you more details about what parts of my notes we will cover.
Pictures	Occasionally, I may post some pictures here.
Homework	Homework assignments will be assigned and collected over the course of the semester. You are encouraged to collaborate on solving the assigned problems as long as everyone in the group gains a thorough understanding of the solution. Furthermore, each student must write up the solution in their own words based on their own understanding. Here are the homework assignments. Here are some Comments and answers on homework assignments.

Grading	Your course grade will be determined by your attendance and your performance on the assignments.
Final Exam	This class has a final exam scheduled for Wednesday, December 13, 8:00-11:00. The final exam will be a take-home exam. This take-home will look just like the other assignments, will be about as long as the other assignments and will contribute exactly as much to your final grade as each of the other assignments. However, it is a take-home final exam.
N.C. State Policies, Regulations, and Rules	Students are responsible for reviewing the NC State University PRR's located at http://oucc.ncsu.edu/course-rights-and-responsibilities which pertains to their course rights and responsibilities. (I am required to include the above statement verbatim, even though it contains a broken link.)
Policy on Attendance and Make-ups	Attending every lecture (in its entirety) is considered part of the course requirement. No provisions will be made for students to make up missed work or tests except as spelled out in the University's attendance regulation available at http://policies.ncsu.edu/regulation/reg-02-20-03 .
Policy on Incompletes	Incompletes are not offered except in cases where special circumstances (such as outlined in the attendance regulation mentioned above) make it impossible for a student to complete the course. Even in these special circumstances, incompletes will not be offered unless the student was in a position to pass the class before the special circumstance arose. In particular, incompletes cannot be used as a way to "bail out" when a student feels that they cannot pass the course or feels they cannot do all the work they put off until the end of the semester.
Statement for students with disabilities	Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Services Office at Suite 2221, Student Health Center, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see Academic Accommodations for Students with Disabilities Regulation (REG02.20.01) .
Academic Integrity	Students are expected to conform to standards of academic integrity as described in the Code of Student Conduct, which can be found at http://policies.ncsu.edu/policy/pol-11-35-01 . The student, by signing or writing their name on a homework assignment or test, affirms that they have neither given nor received unauthorized aid. (See "Homework Assignments" above for guidelines on acceptable collaboration on homework.)
NCSU Counseling center:	The Counseling Center offers confidential counseling to NC State students experiencing personal, academic or vocational problems. Check out counseling.dasa.ncsu.edu .
Help for students in distress:	Although the counseling center is a great help, sometimes it's hard to recognize when we need help. So we need to look out for each other too. Occasionally, you may come across a fellow student whose behavior worries you. You can and should report worrisome behavior to the NC State's Students of Concern website: http://studentsofconcern.ncsu.edu . Although you can report anonymously, it is preferred that you share your contact information so they can follow-up with you personally.

Have a suggestion to improve the course? Try the [anonymous feedback](#) system. Please note that this feedback will come to me without your name. (In cases where the content of the message violates the law or the University's [Code of Student Conduct](#), however, there is a mechanism in place for revealing your identity.) Criticism and complaints about my teaching are fine. The more constructive the criticism, the more likely it is to actually improve the course. **In most cases**, non-anonymous feedback is more appropriate! Send me an email with your comments.