

Math 721 – Abstract Algebra II – Spring 2020

T, Th 10:15 - 11:30 am in 222 Daniels Hall

Instructor: Cynthia Vinzant

Tentative Office Hours: Mon, Wed 1:30-2:30pm
or by appointment

Office: SAS 3260
email: clvinzan@ncsu.edu

Textbook: Dummit and Foote (3rd edition), *Abstract algebra*, Wiley 2003

Course website: <https://clvinzan.math.ncsu.edu/teaching/721/>

Prerequisites: MA 521

Course Description: This course will cover the theory of modules, tensors, and the representation theory of finite groups.

Homework will be assigned weekly and due at the beginning of class on Thursday, unless explicitly stated otherwise. Late homework will not be accepted, but the lowest two homework grades will be dropped.

Participation: Students are encouraged to actively participate in the course. This includes asking questions and volunteering answers in class, as well as in office hours and via email.

Exams: There will be two midterm exams and a final exam.

Midterm Exam 1: Tuesday, February 11, in class

Midterm Exam 2: Tuesday, March 17, in class

Final exam: Tuesday, April 28, 8-11am, Room 4 Winston Hall

Grades will be calculated by

Homework (35%), Participation (5%), Midterms (15% each), Final exam (30%),

based on the the scale A: (> 85%), B: (70-85%), C: (60-70%), D-F: (<60%).

Academic Integrity: Students are expected to follow the NC State code of student conduct, available at <http://policies.ncsu.edu/policy/pol-11-35-01>.

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 Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. More information on NC State's policy on working with students with disabilities is available at <http://policies.ncsu.edu/regulation/reg-02-20-01>.

Class evaluations will be available online for students to complete during the last two weeks of class. Students will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations. All evaluations are confidential; instructors will never know how any one student responded to any question, and students will never know the ratings for any particular instructors.

Rough schedule:

Module Theory (≈ 10 weeks)

- (3 weeks) Ch 10: Module basics, free modules and modules given by generators and relations, direct sum, tensor product and Hom.
- (1 weeks) Ch 11: Tensor, symmetric, and exterior algebras
- (3 weeks) Ch 12: Noetherian rings and modules, modules over principal ideal domains, structure theory and applications
- (1 week) Ch 15: Primary decomposition in Noetherian rings and modules
- (2 weeks) Ch 17: Introduction to Homological algebra: complexes and cocomplex of modules, homology and cohomology

Representation Theory (≈ 4 weeks) Ch 18.

- (1 week) Representation theory of groups, Modules over the group ring
- (1 week) Irreducible representations and Schur's Lemma
- (1 week) Character theory, the orthogonality relations
- (1 week) Introduction to representations of symmetric groups