MATH 433, Section 500
Applied Algebra
Spring 2015

Instructor: Yaroslav Vorobets
Time: MWF 11:30 a.m. – 12:20 p.m.
Location: BLOC 160
Web page: `http://www.math.tamu.edu/~yvorobet/MATH433/`

Office: BLOC 223b (email: `yvorobet@math.tamu.edu`).

Office hours: MWF 10:15 – 11:15 a.m., and by appointment.

Text: J. F. Humphreys, Y. P. Prest, *Numbers, Groups and Codes*, 2nd ed., Cambridge University Press, 2004.

Prerequisites: MATH 220 or 302 (discrete mathematics); MATH 304 or 323 (linear algebra).

Course content: see the next page.

Grading system: There will be 12 quizzes, 3 in-class exams and the final comprehensive exam. The midterm exams are worth 100 points (or 16.6% of the final grade) each, the final exam is worth 150 points (or 25% of the final grade). Extra credit can be earned by solving bonus problems. The quizzes will account for another 150 points (or 25% of the final grade). The final grades will be assigned according to the 90–80–70–60% scale, that is, A for 540+ pts, B for 480–539 pts, C for 420–479 pts, D for 360–419 pts, and F for less than 360 pts.

The *tentative* dates for the midterms are February 20, April 1 and May 1. The final exam is scheduled for Tuesday, May 12, 10:30 a.m. – 12:30 p.m.

Make-ups: Make-ups for missed quizzes and exams will only be allowed for a university approved excuse in writing. Wherever possible, inform the instructor before a quiz or an exam is missed. Consistent with University Student Rules, students are required to notify the instructor by the end of the next working day after missing an exam. Otherwise, they forfeit their rights to a make-up.

Academic integrity: Copying another student's work is dishonest and academically worthless. Information about the Honor Council Rules and Procedures can be found at `http://aggiehonor.tamu.edu/`

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Students with disabilities: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Room B118 of Cain Hall or call 845–1637. For additional information, visit `http://disability.tamu.edu/`

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Course content: This course is an introduction to the algebraic concepts of groups, rings, and fields, with an emphasis on modular arithmetic. Applications include topics in number theory and coding theory.

Course outline

Part I ($\approx$ 4.5 weeks): *Number theory*
- Mathematical induction
- Euclidean algorithm
- Primes, factorisation
- Congruence classes, modular arithmetic
- Euler's theorem
- Public key encryption

Humphreys/Prest: Chapter 1

Part II ($\approx$ 5 weeks): *Abstract algebra and more*
- Functions, relations
- Finite state machines
- Permutations
- Abstract groups
- Other algebraic structures (rings, fields, etc.)

Humphreys/Prest: Chapters 2 and 4

Part III ($\approx$ 4.5 weeks): *Group theory and polynomials*
- Subgroups, cyclic groups
- Cosets, Lagrange's theorem
- Classification of groups
- Error-detecting and error-correcting codes
- Division of polynomials
- Factorisation of polynomials

Humphreys/Prest: Chapters 5–6