

MA 340 - Applicable Algebra
MWF 1:00pm – 1:50pm in CB 347

Spring 2015

Instructor: Dr. Martha Yip

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Office: POT 775

Office hours: Mondays 10–11am

Tuesdays 3–4pm

Wednesdays 2–3pm, or by appointment



Course website: all course announcements and supplementary lecture materials will be posted at:

<http://ms.uky.edu/~myip/teaching/ma340.html>

Email policy: My preferred method for contact is by email. To ensure that your emails get answered promptly (within 24 hours) and not get caught in spam filters, please

- have the Course Number (MA 340) in the subject line,
- have your Name in the body of the email, and
- use your UK email account.

Course Goals: Students in MA 340 will learn basic theory in Rings and Fields, and how the theory applies to the study of Coding Theory. Topics include:

- Modular arithmetic: Fermat’s Little Theorem, Euler’s Theorem, Chinese Remainder Theorem
- Polynomial rings: Euclid’s unique factorization algorithm
- Fields: Finite fields
- RSA public key cryptography
- Coding theory: Hamming codes, Linear codes, Cyclic codes, Reed-Solomon codes, BCH codes

Other learning outcomes in this course include:

- practice in reading research papers
- practice in proof-writing.

Prerequisites: MA 213 and/or MA 322.

Textbooks: Childs, *A Concrete Introduction to Higher Algebra*, 3rd ed. 2008.

Adams, *Introduction to Algebraic Coding Theory*, 2008.

Rivest, Shamir, Adleman, *A Method for Obtaining Digital Signatures and Public-Key Cryptosystems*, Communications of the ACM **21** (2): 120–126, 1977.

We will cover parts of Chapters 2-9,11-15,17,19,23,25 from Childs, and parts of Chapters 1-4 from Adams.

Reading: A **course calendar** (subject to revision during the semester) is available through the course website. There, you can find out which sections in the textbook will be covered during each lecture. *It is expected that you have read the relevant textbook sections before each lecture, so that the lecture will serve as a second chance for you to really solidify your understanding. As well, supplementary material not found in the textbook will be presented during lecture to complement your reading.* Some students learn better by reading, and others by listening, but you should take advantage of both modes of learning.

Assignments: **Problem sets** are assigned weekly, and are posted on the course website. They will be collected at the end of class on each due date.

In order to be successful in this course, it is important that you make every effort to complete the assignments. Help is available during my office hours, but *it is recommended that you attempt the homework on your own before seeking help*. In addition, you are encouraged to discuss course material with your fellow classmates, but *your submitted written work must be in your own words*. If you decide to use other sources (eg. textbooks, papers, the internet) as reference, *make sure that you reference every source properly*.

Examinations: There are three in-class Tests and one Final Exam:

- Test 1: Monday February 2, in class
- Test 2: Monday March 2, in class
- Test 3: Monday April 6, in class
- Final: Wednesday May 6, 1:00pm - 3:00pm

Electronic devices are not allowed during any tests or exams.

Grading Scheme: Your cumulative average is computed as follows:

40% Homework, 10% Test 1, 10% Test 2, 10% Test 3, 30% Final.

Your course grade will be determined by your cumulative average at the end of term and will be based on the following scale:

| | | | | |
|-----------|-----------|-----------|-----------|--------|
| A | B | C | D | E |
| ≥ 90 | ≥ 80 | ≥ 70 | ≥ 60 | < 60 |

Blackboard will be used as a grade server so that you can easily keep track of your grades.

Make-up tests: If you miss a test due to an **excused absence**, the make-up must be written within three working days of the originally scheduled test.

Re-grades: If a re-grade for a test is requested, I will carefully re-grade your entire test, and your total score may increase or decrease as a result of the re-grade.

Academic Accommodations: If you have a documented disability that requires academic accommodations, please see me as soon as possible. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, jkarnes@uky.edu) for coordination of campus disability services available to students with disabilities.

Academic Integrity. Academic honesty is fundamental to our community. Violations of academic integrity may result in suspension or expulsion from the university. For details see <http://www.uky.edu/StudentAffairs/Code/part2.html>.

For information on the Office of Academic Ombud Services' definition of plagiarism, and UK's academic offense policy, see <http://www.uky.edu/Ombud/Plagiarism.pdf>.