Syllabus - MATH 2500
Introduction to Number Theory
Winter 2013

Don't just read it; fight it! Ask your own questions, look for your own examples, discover your own proofs. Is the hypothesis necessary? Is the converse true? What happens in the classical special case? What about the degenerate cases? Where does the proof use the hypothesis? - Paul Halmos

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Lectures: 12:30–1:20 MWF : 111 Armes

Office Hours: 10:00–11:00 Monday & Wednesday, 1:15–2:15 Tuesday

Textbook: Underwood Dudley, *Elementary Number Theory*, 2^{nd} ed.

Course Outline:
The following topics, which will be covered, can be found in the textbook, sections 1–12, and appendix A.
Induction, Divisibility and the Euclidean Algorithm, Unique Factorization, Linear Diophantine Equations, Congruences, Linear Congruences, Fermat theorem, Wilson Theorem, Some Multiplicative functions, Perfect Numbers, Euler's Function & Euler's Theorem, Primitive Roots, Quadratic Congruences, Quadratic Reciprocity,
(if time permits) Pythagorean Triples
We will also cover RSA encryption, which does not appear in the textbook. (Resources will be available on the website.)

Evaluation of Student Performance:

Assignments	10%	4 assignments equally weighted
Midterm	35%	Thursday, March 7^{th} , 5:30 - 7:00pm
Final Examination	55%	(3 hours, To Be Scheduled by Registrar)

Assignments:
There will be 4 assignments given throughout the term, with tentative due dates of January 30^{th}, February 15^{th}, March 4^{th}, and April 3^{rd}.
Copies of the assignments will be available approximately one week before their due date.
This is *individual* work, and must be accompanied by an honesty declaration (found on the website).
A simple calculator should be the only aid used to complete these assignments.
Late assignments will not be accepted.

Website:
http://home.cc.umanitoba.ca/~davidsom/

Calculators: Simple calculators will be allowed for tests and exams. They should be single line display, with no programming ability.

Recommended Exercises:

Section	Topic	Exercises
A	Induction	Page 208: 1–8,10,14,15
1	Divisibility and the Euclidean Algorithm	Page 9: 1–15
2	Unique Factorization	Page 19: 1–15
3	Linear Diophantine Equations	Page 26: 1–5
4	Congruences	Page 32: 1–12
5	Linear Congruences	Page 40: 1–12
6	Fermat and Wilson Thms.	Page 48: 1–12
7	Some Multiplicative functions	Page 55: 1–14
8	Perfect Numbers	Page 61: 1–6
9	Euler's Function & Euler's Theorem	Page 71: 1–16
	RSA Encryption	TBA
10	Primitive Roots	Page 81: 1–13
11	Quadratic Congruences	Page 93: 1–12
12	Quadratic Reciprocity	Page 104: 1–4
	(if time permits)	
(16	Pythagorean Triples	Page 133: 1–8)

You should expect assignments to be different than the recommended exercises.

Notes:

- The Voluntary Withdrawal Deadline is Wednesday, March 20$^{\text{th}}$
- No make-up midterms will be given. If you miss a midterm, you will be assigned a grade of 'zero' unless reasons and acceptable supporting evidence are provided.

Note on Academic Honesty:

The Department of Mathematics, the Faculty of Science and the University of Manitoba regard acts of academic dishonesty in quizzes, tests, examinations or assignments as serious offenses and may assess a variety of penalties depending on the nature of the offense.

Acts of academic dishonesty include bringing unauthorized materials into a test or exam, copying from another student, plagiarism and examination personation. Students are advised to read section 7 (Academic Integrity) and section 4.2.8 (Examinations: Personations) in the"General Academic Regulations and Requirements" of the current Undergraduate Calendar. Note, in particular that **cell phones and pagers are explicitly listed as unauthorized materials, and hence may not be present during tests or examinations.**

Penalties for violation include being assigned a grade of zero on a test or assignment, being assigned a grade of"**F**" in a course, compulsory withdrawal from a course or program, suspension from a course/program/faculty or even expulsion from the University. For specific details about the nature of penalties that may be assessed upon conviction of an act of academic dishonesty, students are referred to University Policy 1202 (*Student Discipline Bylaw*) and to the Department of Mathematics policy concerning minimum penalties for acts of academic dishonesty.

All students are advised to familiarize themselves with the *Student Discipline Bylaw* , which is printed in its entirety in the Student Guide, and is also available on-line or through the Office of the University Secretary. Minimum penalties assessed by the Department of Mathematics for acts of academic dishonesty are available on the Department of Mathematics web-page.