

MATH 324 (A1) *Elementary Number Theory*

- Lectures:** September 5 - December 5
MWF 11:00 - 11:50 CAB 229
No classes on Monday October 8 or Monday November 12.
- Instructor:** Matilde N. Lalín
CAB 621, office hours M 12:00 - 13:00, W 10:00 - 11:00 and by appointment
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www.math.ualberta.ca/~mlalin/math324.html
- Description:** Divisibility, prime numbers, congruences, quadratic residues, quadratic reciprocity, arithmetic functions and diophantine equations; sums of squares.
- Prerequisites:** MATH 228 (or 128 or 223)
- Textbook:** K. H. Rosen, *Elementary Number Theory and its Applications*
5 th edition, Addison-Wesley
- Assignments:** They will be posted on the website. Solutions will also be posted on the website. Assignments will not be marked. You are encouraged to come to my office hours to show me your work or if you have any questions.
- Weights:** First Midterm 40 %, Second Midterm 15 %, Final 45 %.
- Exam Dates:** First Midterm Exam - Monday October 22, 2007, in class.
Second Midterm Exam - Monday December 3, 2007, in class.
Final Exam - Wednesday December 12, 2007, 9:00 - 12:00
Deferred Final Exam - Saturday January 12, 2008, 9:00 - 12:00
- Grading:** Based on a combination of absolute measures and distribution according to statistical properties for the same class in previous years. Here is a guide:

95 - 100:	A+	90 - 94:	A
85 - 89:	A-	80 - 84:	B+
75 - 79:	B	70 - 74:	B-
65 - 69:	C+	60 - 64:	C
55 - 59:	C-	50 - 54:	D+
45 - 49:	D	0 - 44:	F

Syllabus (tentative!)

Overview

- Sequences (1.1)
- Sums (1.2)
- Mathematical Induction (1.3)
- The Fibonacci Numbers (1.4)
- Divisibility (1.5)

Primes and GCDs

- Prime numbers (3.1)
- Distribution of primes (3.2)
- Greatest common divisors (3.3)
- Euclidean algorithm (3.4)
- Fundamental theorem of arithmetic (3.5)
- Factorization methods (3.6)

Congruences

- Linear Diophantine equations (3.7)
- Introduction to congruences (4.1)
- Linear congruences (4.2)
- Chinese remainder theorem (4.3)
- Polynomial congruences (4.4)

Special congruences

- Wilson's and Fermat's little theorem (6.1)
- Euler's theorem (6.3)

Multiplicative functions

- Euler's ϕ function (7.1)
- Sum and number of divisors (7.2)
- Perfect numbers and Mersenne primes (7.3)
- Möbius inversion (7.4)

Primitive roots

- Order of an integer and primitive roots (9.1)
- Primitive roots for primes (9.2)
- Existence of primitive roots (9.3)
- Index arithmetic (9.4)

Quadratic residues

- Quadratic residues (11.1)
- Law of quadratic reciprocity (11.2)
- Jacobi symbol (11.3)

Continued fractions

- Decimal fractions (12.1)
- Finite continued fractions (12.2)
- Infinite continued fractions (12.3)
- Periodic continued fractions (12.4)

Nonlinear Diophantine equations

- Pythagorean triples (13.1)
- Fermat's last theorem (13.2)
- Sum of squares (13.3)
- Pell's equation (13.4)

Missed term exams: If you are unable to write a term exam because of an incapacitating illness, severe domestic affliction or other compelling reasons, you can apply for deferral of the term exam weight to the final exam. Applications for deferral of the term exam can be made in writing to the professor, with supporting documentation, within 48 h of the missed exam date. Deferred of term work is a priveledge and not a right.

Deferred Final Examination: A student who cannot write the final examination because of an incapacitating illness or is suffering from severe domestic affliction or other compelling reasons can apply for a deferred final examination. Such an application must be made to the students Faculty office within 48 hours of the missed examination and must be supported by a completed University of Alberta Medical Statement Form or other appropriate documentation (Calendar section 23.5.6). Deferred of final examination is a priveledge and not a right.

Academic Integrity: The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

Exams: Your student photo I.D. may be required at exams to verify your identity. Students will not be allowed to begin an examination after it has been in progress for 30 minutes. Electronic equipment is not to be brought to exam.

Cell Phones: Cell phones are to be turned off during lectures. Cell phones are not to be brought to exams.

Students with Disabilities: Students who require accommodation in this course due to a disability are advised to discuss their needs with Specialized Support & Disability Services (2-800 Students Union Building).

Academic Support Center: Students who require additional help in developing strategies for better time management, study skills or examination skills should contact the Academic Support Centre (2-703 Students Union Building).

Policy about course outlines can be found in section 23.4(2) of the University Calendar.

Disclaimer: Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar and takes precedence over the final examination date reported in this syllabus.