

Professor: Dr. Martin Montgomery

Office: Stewart 332

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Course Web Page: <http://cyrus.piedmont.edu/users/mmontgomery/>

Textbook: *Elements of Number Theory* by John Stillwell

Time: Monday, Wednesday, Friday 12-1.

Office Hours: MWF 11-12. Also by Appointment (see schedule online).

Course Description:

In this course, we develop techniques of proof and computation in number theory in order to extend results from basic number systems (natural numbers, integers, etc...) to those that are more complicated. The ideas will culminate in the development and application of quadratic reciprocity.

Grading:

Your grade in this course will be based on your performance on homework, three exams during the 16 week term, and a fourth exam given during the final exam time.

Homework

Homework may consist of a list of problems from the course textbook, supplementary problems I supply, or a combination of the two. Homework will be collected on Fridays (other than exam weeks, see attached schedule). Some homework problems require much thought, so be sure to start the homework early. I encourage you to work together on the homework, as long as everyone does their own work.

Reading

About every week, I will ask you to read a particular section of the book. This will usually be section of material that we have not yet covered (but will cover soon thereafter). After you read the section or sections, you will "**Make a Question and Ask a Question**". By email, you will submit to a basic (true false, multiple choice, easy calculation) question related to the assigned reading. You will also ask a question related to anything you found confusing in the text. Part of your homework grade will be based upon your submissions for the reading portion of the course.

Exams

There will be three exams during the regular 16 weeks of the course and a fourth exam during the normally schedule final exam time. See the attached schedule for exam dates. The final exam (Exam 4) is scheduled for 1–3 P.M. May 6.

Attendance Piedmont College is instituting (or rather, enforcing) a new attendance policy. Here it is:

Attendance, timeliness, and participation are required and part of your grade. More than the allotted number of absences for any reason will result in failure of the course. The maximum allotted number of absences is as follows:

Day classes meeting three times a week for entire semester: **6 absences**

Courses operating under a different format to be determined by the professor of the course.

All absences for participation in recognized school events (e.g., athletics, drama, field trips) will count against the announced absence policy.

A request for consideration of an exception to this policy must be submitted in writing to the appropriate Dean.

Letter Grades

The course is graded using the standard breakdown for letter grades, i.e. 90-100 for a letter grade of A, 80-89 for a grade of B, 70-79 for a grade of C, 60-69 for a grade of D, and F for 59 and below. Note that routine mastery of the material generally earns a letter grade of B or C. Earning a grade of A requires synthesis and creativity.

Homework	20%
Exam 1	20%
Exam 2	20%
Exam 3	20%
Exam 4	20%

Some Legal Disclaimer Stuff

Prerequisite: Discrete Math (Math 200) or some similar course.

Academic Integrity: The college imposes strict penalties for academic dishonesty, which is defined as follows

- **Cheating:** Intentionally using or attempting to use unauthorized materials, information or study aids in any academic exercise.
- **Fabrication** Intentional and unauthorized invention or falsification of any information or citation in an academic exercise.
- **Facilitating Academic Dishonesty:** Intentionally or knowingly helping or attempting to help another to commit an act of academic dishonesty.
- **Plagiarism:** Intentionally or knowingly representing the words or ideas of another as one's own in any academic exercises

Details and administrative procedures may be found in the Piedmont College Student.

Withdrawal: See student catalog or other supplementary material for policy and dates associated to withdrawals.

Students with Disabilities: Piedmont College makes every effort to provide reasonable and appropriate accommodations to students with disabilities. Accommodations must be coordinated through the Office of Counseling and Career Services by contacting the director at 1-800-277-7020 ext. 1259 or by email - kcutrell@piedmont.edu. Students are responsible for providing accurate and current documentation of their disability and for making a written request to the Director of Counseling and Career Services before receiving accommodations. Students with special needs (disabilities, problems, or any other factors that may affect their performance or that require special instructional strategies) should also make these needs known to the professor/instructor during the first class session.

Math 340 Lecture Schedule

Week	Monday	Wednesday	Friday
0 Jan. 5–Jan. 9	No Class	No Class	Syllabus Induction
1 Jan. 12–Jan. 16	Division	Diophantine Equations	Gaussian Integers HW1 Due
2 Jan. 19–Jan. 23	MLK Day (No Class)	Euclidean Algorithm	Primes HW2 Due
3 Jan. 26–Jan. 30	Linear Diophantine Eqs.	Catch-up	Congruences HW3 Due
4 Feb. 2–Feb. 6	Exam 1 Review	Exam 1	Fermat's Little Theorem
5 Feb. 9–Feb. 13	Wilson's and Langrange's Theorem	Inverses	Primitive Roots HW4 Due
6 Feb. 16–Feb. 20	RSA	More RSA	The Pell Equation HW5 Due
7 Feb. 23–Feb. 27	$x^2 - 2y^2 = 1$	The General Pell	Catch-up HW6 Due
8 Mar. 2–Mar. 6	Exam 2 Review	Exam 2	Primes in $\mathbb{Z}[i]$
9 Mar. 9–Mar. 13	Spring Break!	Spring Break!	Spring Break!
10 Mar. 16–Mar. 20	Conjugates and Division in $\mathbb{Z}[i]$	Fermat's Two Square Theorem	Pythagorean Triples HW7 Due
11 Mar. 23–Mar. 27	Primes of the form $4n + 1$	Division in $\mathbb{Z}[\sqrt{2}]$	Quadratic Integers HW8 Due
12 Mar. 30–Apr. 3	Rational Solutions of $x^3 + y^3 = z^3 + w^3$	Fermat's Last Theorem for $n = 3$	Catch-up HW9 Due
13 Apr. 6–Apr. 10	Exam 3 Review	Exam 3	Good Friday (No Class)
14 Apr. 13–Apr. 17	Real and Complex Matrices	Quaternions and $\mathbb{Z}[i, j, k]$	The Hurwitz Integers and Conjugates HW10 Due
15 Apr. 20–Apr. 24	The Four Square Theorem	What is Quadratic Reciprocity?	Euler's Criterion HW11 Due
16 Apr. 27–May 1	More Quadratic Reciprocity	Chinese Remainder Theorem	Exam 4 Review HW12 Due
17 May 4–May 6	Exam 4 May 6, 1–3 P.M.		