MATH 430 – Number Theory – SPRING 2013

Your Prof: James D. Harper, Ph.D.   **Office:** 107C Bouillon
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Office Hours
Tuesday to Thursday   11:00 to Noon
Friday   9:00 to 10:00
And by appointment.

Text *Elementary Number Theory* by James K Strayer

Syllabus Selections from chapters 1, 2, 3, 6 & 7.

Also, there will additional topics not found in our textbook.

Grading System
Homework   30%
Homework will be assigned and collected on a regular basis.
Your homework will be read and commented on.
Extra credit is encouraged! See next page.

Midterm Exam   30%
There will be one in – class midterm exam for your pleasure and enjoyment. ☺
Tentative Date: Friday, April 26th

Final Exam   40%
The Final Exam will be a take-home.
Handed out: Wednesday, May 29th
Due: Monday, June 3 by Noon.
N.B., Friday, May 31st will be an in – class activity day.
There is also a research paper option in lieu of the final exam. See next page.

Grading Scale
A: 90%   B: 80%   C: 70%   D: 60%
Note: A minus grade is "-3%" and a plus grade is "+3%".
E.g., 77% is a B- and 83% is a B+.

Important Dates
Memorial Day Holiday   Monday, May 27th

Course Objectives
This course introduces students to selected topics in Number Theory that will reinforce the proof writing skills learned in MATH 260 (Logic & Sets). There is also a fair amount of computation involved that will reinforce the concepts and provide insight and intuition. Fundamentally, Number Theory is the study of divisibility, factorization and primes in the positive integers. This study will lead us to investigate all the integers (positive, negative & zero) and the rational numbers as well. Learner objectives, outcomes and skills include, but are not limited to:

- using the Euclidean Algorithm to find the gcd of a pair of positive integers and solve linear congruence equations
- understanding and using the Fundamental Theorem of Arithmetic to compute and solve a variety of problems
- applying the Chinese Remainder Theorem
- using Fermat's *Little* Theorem (FLT) and Euler's Generalization of FLT
- computing Pythagorean Triples and solving related problems
- solving linear congruence equations
- knowing some of the history, significance and role Fermat's **Last** Theorem has played in mathematics, especially, number theory.

Comments

1. **Exam**. The exam for this course can be broken up into the following five components:
(i) Definitions & Named Theorems:
     Logically equivalent statements for definitions and any theorem that has a name.
(ii) Basic proofs:
      You should know any proof I give in class that is starred: **proof***.
(iii) True – False
       You know what true – false questions are like.
(iv) Computations:
     Routine computations similar to HW problems.
(v) Original proofs:
     Routine proofs similar to HW problems.

2. **Extra Credit**. Any challenging, at the very least non – trivial, problem from our text may serve as extra credit applied to the HW. These problems are not restricted to assigned chapters. Even better, if you have found your own pattern and you think you can prove it, submit it.
In general, consult with me on any problem you find interesting.
Deadline for any extra credit is Friday, May 24th.

3. **Research Paper**. A research paper/project, minimum five pages and three works cited, can be submitted in lieu of the Final Exam. Deadline for topic approval is Friday, May 10. Team projects (two students) are welcome. Students must have a B or better to pursue this option. Details and paper/project suggestions will be given upon request.

4. **Homework Protocol** Ideally, homework should be done individually. However, your MATH 430 professor understands the value of collaborative work or receiving help from someone other than yours truly. All I ask of you is that you document those from whom you received assistance. In these cases please write at the beginning of your homework paper:
(i) "I received help (assistance, hints) on problem(s) _____ from _____."
or
(ii) " 'Ethan' and I worked together on problem(s) _____."

If you receive help from a tutor (private or skills center), please mention this information as well. When working with a tutor, ask this person to read your notes, related handouts and pertinent sections of the textbook.