INSTRUCTOR
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COURSE
name: Number Theory (section 2-code 8225)
meeting time: TTh at 11:00-12:15 p.m.
meeting place: LA5-147
text: Notes
materials: A reasonable calculator
prerequisites: The official prerequisite is Math 233. More than the content, you will need the maturity acquired by the exposure to some real mathematics. Realistically I will assume you know induction. You will need to know matrix multiplication in any case, and the basic facts about determinants.
description: The course is an introduction to number theory, a beautiful, and one of the oldest, branch of mathematics. It is a common and ancient, yet modern, dilemma, the confrontation between the discrete and the continuous. From the early civilizations where the difference between solar and lunar calendars wreaked havoc through the assignment of representatives in the early American congress to the great debate between the builders of the first computers in the middle of our century, the nature of number has played a crucial role. Most of the best mathematicians throughout the ages have contributed and cared for number theory (from Pythagoras to Gauss for our course). Commonly considered one of the purest areas, it is surprising in its applications (especially nowadays), and at the root of its modern importance is the tremendous computational ability we have gained in the last 30 years. For our course, number will normally mean whole or rational number, and among the notions we will look at are primes, divisibility, modularity, factorization and others.
tentative syllabus: Pythagorean Triples Euclidean Algorithm Diophantine Equations Modularity & Congruences Primes & Factorization Orders & Euler's Theorem
bibliography: There are many books written on number theory. For your enhancement in the appreciation of the subject, I recommend *The Penguin Dictionary of Curious and Interesting Numbers*. Among the economical ones I believe you will find interesting are: *Higher Arithmetic* by Davenport; *From Fermat to Minkowski* by Scharlau & Opolka and *Number Theory & Its History* by Ore.

goals & objectives: There are two major objectives in the course. First, the mastery of the material to a level that will allow you to do problem solving. Second, to improve your sense of mathematical rigor and the reading and writing of mathematics and its arguments.

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

ADMINISTRATIVE

timeliness Everything should be on time when assigned unless compelling reasons exist.

make-up policies: A make-up exam will be considered when you inform me ahead of time and have a reasonable excuse, or other very special circumstances.

last day to drop: Friday, November 18th, 2016 is the last day to drop the course without the Dean's signature. If you intend to drop, please secure my signature in plenty of time. Additionally, since this course has high enrollment, and some students have not been able to register, if you do not make a serious effort to succeed in the course, you will not be allowed to drop.

Disability Please inform me as soon as possible, but certainly within two weeks from the start of the course, of any assistance you may need to deal with any university-verified disability/special need.

ASSESSMENT As follows:

<table>
<thead>
<tr>
<th>Tests</th>
<th>Midterm Exam</th>
<th>Tuesday October 11</th>
<th>20%</th>
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<tbody>
<tr>
<td></td>
<td>Final Exam</td>
<td>Thursday Dec 15, 10:15-12:15</td>
<td>25%</td>
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Homework Every week, homework will be posted on the web with its due date. Homework should not be late. It will be picked up at the beginning of the class. Team work for the homework is acceptable (if not preferred). Usually, as in most of the courses I teach, a student who has done her/his homework performs adequately in the exams.

Quizzes Every Tuesday the class will start with a short quiz. No preparation is needed. There will be no make-ups for the quizzes, but the three lowest scores (including 0’s) will be dropped.
Research Project

You will be a member of a team (of 2 students) and will choose one of the black sections in the notes to do research on and explain it to the rest of the class when ready.

Class Participation

Class participation is mainly up to my discretion. The final grades will be assigned (approximately) traditionally.