Introduction to Number Theory **Math 110** **Summer Session I, 2018.**

MWF 9:00 – 11:30 am, Natural Sciences Annex, 103

http://people.ucsc.edu/∼yorik/Math110

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Required text: *Elementary Number Theory,* 2nd *edition*, by Underwood Dudley.

Course Description: Math 110 is an introduction to elementary number theory. Topics include divisibility, the prime numbers and their distribution, congruence arithmetic, quadratic reciprocity and Diophantine approximation, among others. See the lecture schedule for more details.

Reading: Students are expected to read the book, ***early and often***. By this I mean that you should plan on reading all the relevant chapters in the book at least twice before the end of the course, as well as the supplementary notes on the course website, and that you should stay ahead of the lectures (as described in the schedule that follows).

Homework: Every reading assignment is accompanied by homework problems. Doing (or trying to do) the homework assignments is the best way to master the material. Homework will not be collected or graded.

Exams: There will be a quiz in class every Friday and a comprehensive final on the last Friday of the session. There will be no make-up quizzes, but your lowest quiz score will be dropped.

Course grade: Your three highest quiz scores contribute 20% each to your course grade and the final exam contributes 40%. Letter grades will correspond (approximately) to the following ranges:

Overall Score	Grade
90 – 100	A− to A+
80 – 89	B− to B+;
65 – 79	C to C+
60 – 64	C-
50 – 59	D
0 – 49	F

Key Summer Session dates:

Last day to enroll: Thursday, June 28
Last day to drop: Monday, July 2 (with refund)
Last day to withdraw: (no refund) Friday, July 13
Last day to change grade option: Friday, July 7

Students with disabilities: If you qualify for classroom/exam accommodations because of a disability, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me as soon as possible, preferably within the first few days of the course. Contact DRC by phone at ***831-459-2089*** or by email at ***drc@ucsc.edu*** for more information.

TIPS FOR SUCCESS

1. Come to ***all the lectures***, and come prepared — read the assigned sections at least once before the lecture, so you have an idea of what we will be discussing in the lecture. You don't have to read the material in depth the first time through. Have a look at the homework for the sections you have read — take note of the problems you find difficult or mysterious.

2. Read the material again after the lecture, this time in more depth. Read actively: take notes, try to work through the examples on your own.

3. Work in detail on the relevant homework problems after the second reading. Make a note of the problems that you don't understand so that you can ask about them.

4. ***Ask questions*** in class, during office hours and in section. Remember: the more specific your question, the better and more helpful the answer is likely to be.

5. Study with friends for a few hours a week. Technical skills can be practiced alone, but concepts are better learned when *discussed*.

6. The standard for a 5-unit course at UCSC is 15 hours a week in a 10 week quarter, including lectures, sections and studying outside of class. In a 5-week summer session course, you should realistically expect to spend about 20-30 hours a week with the material in order to succeed.

7. If you feel that you are getting lost, take action. Don't wait and hope 'it goes away'. Come to office hours or ask questions in class to clear up any confusion.

CHEATING:

Cheating in any form (e.g., using notes on quizzes or exams, or copying from someone else) will not be tolerated. Any student caught cheating will be reported to the Math department and to his or her college provost. In most cases, students caught cheating will receive a failing grade. Students who help others cheat are also considered cheaters.

Cheating devalues everyone's grades.
You should not tolerate it either.

Lecture Schedule (subject to change)...
... with Quiz and Exam Dates (not subject to change).

Monday, 6-25: Integers: arithmetic, order, divisibility and the 'division algorithm'.

Reading: Section 1.

Homework. Section 1: 1, 2, 3, 6, 11, 15.

Wednesday, 6-27: Prime numbers and unique factorization. First observations about the distribution of prime numbers.

Reading: Section 2 and Note about primes on course website.

Homework. Section 2: 1, 3, 4, 7, 12, 14.

Friday, 6-29: Linear Diophantine equations; Congruence. ***Quiz 1*** (Sections 1 and 2).

Reading: Sections 3 and 4 (but mostly 3).

Homework. Section 3: 1, 3, 6, 7, 9.

Monday, 7-2: Linear congruences and the Chinese remainder theorem.

Reading: Sections 4 and 5.

Homework: Section 4: 1, 3, 4, 5, 8, 10, 15, 19. Section 5: 1, 3, 5, 9, 11, 15.

Wednesday, 7-4: ***Holiday***

Friday, 7-6: The theorem's of Fermat and Wilson. ***Quiz 2.*** (Sections 3, 4 and 5).

Reading: Section 6.

Homework. Section 6: 1, 3, 4, 6, 7, 12, 15.

Monday, 7-9: Euler's function and the generalization of Fermat's theorem.

Reading: Section 9.

Homework. Section 9: 1, 4, 7, 9, 15, 16.

Wednesday, 7-11: Order (mod m) and primitive roots.

Reading: Section 10.

Homework. Section 10: 1, 3, 6, 7, 9, 16.

Friday, 7-13: Quadratic (and polynomial) congruences. ***Quiz 3.*** (Sections 6 and 9).

Reading: Sections 11 - 12.

Homework. Section 11: 1, 3, 5, 7, 11, 16, 19.

Monday, 7-16: Quadratic reciprocity.

Reading: Section 12 and Note on the course website.

Homework. Section 12: 1, 3, 6, 7.

Wednesday, 7-18: More on the distribution of prime numbers.

Reading: Section 21 (yes, 21).

Homework. Section 21: 1, 2, 3, 4.

Friday, 7-20: Diophantine approximation I. ***Quiz 4.*** (Sections 10 - 12).

Reading: Note on Diophantine approximation (course website).

Homework. Exercises 1 – 4 on the note.

Monday, 7-23: Diophantine Approximation II.

Reading: Note on Diophantine approximation (course website).

Wednesday, 7-25: Catch up and review

Reading: Review problems.

Friday, 7-27: ***Final Exam.*** (Comprehensive)