

Math 545: Number Theory 1, Fall 2013

Instructor: Kevin Milans (milans@math.wvu.edu)

Class Meetings: MW 3:30pm-4:45pm in Armstrong Hall 203

Office Hours: MW 1:30pm-2:30pm, Tues 11am-noon, and by appointment, in Armstrong Hall 408H

Webpage: <http://www.math.wvu.edu/~milans/teaching/fa13/math545/>

Welcome: Welcome to Math 545: Number Theory 1. I have the highest hopes and expectations for our class this semester. To truly learn advanced mathematics, you must actively engage the material in an aggressive way. Before you proceed to a proof, think about the theorem. Play around with some examples. What principles are at work? Why is the theorem true? How might the proof be structured? Thinking about these questions will build a bridge between the new material and your existing knowledge. Those connections will make it much easier to understand and remember the proof, appreciate its beauty, and to recognize when similar principles and techniques apply to new problems. After reading the proof, you might try some modifications. Can any of the hypotheses be weakened? Can any of the conclusions be strengthened? Is there any way to modify the proof to make it more natural or easier to understand?

Learning Outcomes and Course Goals: Students will be introduced to a wide variety of topics in classical number theory, including divisibility, the Euclidean algorithm, Diophantine equations, congruences, primitive roots, quadratic residues, number-theoretic functions, distribution of primes, irrationals, combinatorial methods, and important numbers such as those of Bernoulli, Euler, and Stirling.

Prerequisite: Math 155 or Math 156.

Textbook: *Number Theory* by George Andrews, Dover Publications.

Homework: Homework is crucial to gain a full understanding of course material. Homework is assigned approximately once every two weeks. In working on the homework problems, you may make use of the course textbook and discussions with fellow students and the instructor. Your written work must be entirely your own, which implies that *you must fully understand everything written down on your paper under your own name*. You may not obtain answers to homework exercises by using search engines, other textbooks, scholarly research articles, or other resources, because doing so would defeat the purpose of the homework.

Homework Time Impact: Please plan to spend an average of about 20 hours per homework assignment (10 hours per week). Part of learning involves trying approaches that do not work. This takes time and can be frustrating, but take heart! Everyone who studies and conducts research in mathematics goes through the same struggle, so you are not alone. Just make sure you allot enough time.

Homework Grading Policy: Homework may be submitted up to 1 week late for a score of 50% of what its on-time score would have been. Homework that is more than 1 week late is not accepted. When computing your homework average, your lowest scoring homework is dropped.

Sage: Most homework assignments will contain programming problems. These problems are to be solved using Sage, an open source mathematics engine. You may download sage to your computer, or you may use sage through a web interface at <http://www.sagenb.org/>. Both options are free of charge.

Exams: We will have a take-home midterm exam assigned on Mon. Sept 30 and due on Wed. Oct 2. The final exam is Wednesday, Dec. 18, from 8am-10am. All students must take the final exam during the scheduled exam period, unless specifically exempted by university rules.

Grading Rubric: Course averages are converted to letter grades according to the scale on the right. The instructor reserves the right to lower these thresholds.

Homework	60%
Midterm Exam	15%
Final Exam	25%
Total	100%

A: 90-100	B: 80-89.9
C: 70-79.9	D: 60-69.9
F: 0-59.5	

Other Policy Notes: These policies cover all absences and contingencies, including those due to university Days of Special Concern. In truly exceptional cases, students may be excused from additional homeworks. Students with eligible circumstances should contact the instructor as soon as possible, and appropriate arrangements will be made on a case by case basis.

Academic Integrity: You are expected to practice the highest possible standards of academic integrity. Any deviation from this expectation will, at a minimum, result in an academic penalty of a score of zero on the assignment or test in question. Additional disciplinary measures are possible. For more information, see the university's Student Conduct Code.

University Statement on Social Justice: West Virginia University is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veterans status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise the instructor and make appropriate arrangements with the Office of Disability Services (304-293-6700).