Boston University
Summer I 2010

MA341 Number Theory
Kalin Kostadinov

Syllabus for MA341
Appreciation of Number Theory

Course Content: The course is designed to be a pleasurable flight over the landscape of number theory. We will talk about the various people that carved out this landscape through the ages. Diophantine equations, Euclidean algorithm, Fermat's Last Theorem, the calculations of Euler and the proofs of Gauss, will all be discussed and played with. The students will get the training necessary to appreciate the beauty of number theory, the skills to communicate and argue about it, and the chance to make some discoveries of their own.
Course Prerequisites: There are no formal prerequisites for this class. Some mathematical maturity is expected; however, more important will be the possession of intellectual curiosity, and the desire to take on challenges.
Instructor: Kalin L. Kostadinov, 5f.10in., wears a T-shirt, talks a lot, walks a lot, could add and multiply numbers without calculator.
Contact Information: I could be reached by e-mail at kost@math.bu.edu, or by phone: (617) 353-3923, or drop by my office – MCS 162.
Course Web Page: Go to *http://math.bu.edu/people/kost/teaching* for FAQ, homeworks, lecture notes, and other class related materials.
We will also use ***Blackboard*** online course conducting platform.
Textbook: There is no required text for this class. Lecture notes will be distributed in class, as well as a list of useful readings.
Office Hours: Mondays and Thursdays from 2:00PM to 3:00PM,
other times by arrangement.
Class Meeting Times: MTR 6:00PM-8:30PM
Classroom: PSY B47
Homework: There will be 12 homeworks, 4 problems each, generally assigned after Tuesday and Thursday lectures. There will be also 3 additional problem sets of multiple-choice/fill-in-the-answer questions, that are available on the Blackboard online course management platform. You have unlimited number of tries to complete the online problem sets, but have to be done with them by the end of the third week of classes. Failure to complete the online problem sets translates into an F grade for the whole course. The homeworks score will weigh 40% in the final grade and will be based on your 10 (out of 12) best homeworks only. No late homeworks accepted under any circumstances.
Weekly Quizzes: There will be 5 short quizzes, 10 minutes each, given in class, at the beginning of a lecture. There are no make-ups under any circumstances, so plan to be on time. There will not be any other exams for this class, and the quizzes will account for 10% of the final grade.
Workshops: Each Monday lecture will go in a more interactive, discussion like format, as opposed to our Tuesday and Thursday meetings, which will be more lecture-style oriented. Workshop participation will weigh 20% of the final grade.
Projects: Each student will be asked to work on an individual project, as part of the class requirements. Every project will be a small investigation of a problem from the suggested list of topics. The projects deliveries are going to be a written paper, about 6-7 pages in length, and a 20 minutes presentation in front of the class. The projects will form 30% of the final grade.

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Schedule of lectures

Date	Lecture Topic. Deliverables
5/18	Diophantine Equations: Number Theory meets Algebra and Geometry.
5/20	Small tool, great use: The language of congruences.
	Homework 1 due. Quiz 1.
5/24	Workshop 1: Axioms and Proofs. Building the Integers.
	Homework 2 due. Homework 3 due.
5/25	Divisibility, Factoring, Primes. The Fundamental Theorem of Arithmetic.
	Workshop description due. Project selection date. Quiz 2.
5/27	Close encounters with the prime numbers.
	Homework 4 due. Group activity I.
6/1	Workshop 2: Computers and Number theory.
	Homework 5 due. Homework 6 due.
6/3	Fermat, Euler, and the theorems of Number Theory.
	Workshop 2 description due. Quiz 3
6/4	Sums of squares. Group activity II.
	Homework 7 due. Project outline due.
6/7	Workshop 4: A mathematician's workday - asking questions, making conjectures, and the art of mathematical exploration.
	Homework 8 due.
6/8	Gauss and the Law of Quadratic Reciprocity.
	Draft version of project due. Quiz 4.
6/10	Algebra and Number Theory - the quest for structure.
	Homework 9 due.
6/14	Workshop 3: Applications of Number Theory. Codes and cryptography.
	Homework 10 due.
6/15	Analysis and Number Theory - Riemann, Dirichlet, and their functions.
6/17	The brave new world of p-adic numbers. Quiz 5.
	Homework 11 due. Final writen version of project due.
6/21	Workshop 5: Presentation of Projects.
	Homework 12 due.
6/22	What is it in a PhD thesis.
6/24	Looking back, going forward - last meeting.

Note: The placement of the topics in time is somewhat tentative.
Monday, May 31^{th}, is a University holiday, no class that day.
The class will meet instead on Friday, June 4^{th}.