MTH 521: Theory of Numbers
Course Information Sheet and Syllabus[1]
Fall 2013

Instructor: Dr. Susan Cooper

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Office Hours: Tuesdays & Thursdays 11:00 a.m. – 12:00 p.m.; Wednesdays 10:00 a.m. – 11:00 a.m.; or by appointment

Correspondence: The most reliable way to reach me is via email.

Class Times and Location: TR 9:30 a.m. – 10:45 a.m., Pearce Hall – Room 224

Course Web Page: We will use *Blackboard* which can be found at http://blackboard.cmich.edu/.

Text: *Elementary Number Theory* by Underwood Dudley (Second Edition)

Course Prerequisites: MTH 332 or graduate status

Course Description and Objectives:

"Mathematics is the queen of the sciences and number theory is the queen of mathematics."
C. F. Gauss (1777 – 1855)

You will experience the beauty and power of mathematics by exploring the properties of the integers and some of their modern applications. Number Theory is one of the oldest and most beautiful areas of mathematics, as well as one of the hottest areas of current research and applications. The search for big primes, for example, is a problem as old as ancient Greece and yet is central to many current reports. Part of our fascination with the integers is that they are the simplest of all mathematical objects, known to virtually every culture in recorded history, but problems involving them can be extremely challenging. Our goal will be to discover the key facts about the integers and especially the primes that are needed for many of the modern applications of Number Theory such as card shuffling and cryptology.

By considering concrete examples, you will make conjectures and then try to verify or disprove them. You will gain facility and become confident that you can *do* mathematics and you will experience the joy of discovering hidden patterns and mathematical truths. You will gain an appreciation of the achievements of some of the great masters of the subject and you will see how much of our modern world depends on number-theoretic ideas.

We will cover Sections 1 through 12 of the textbook and other selected topics (some of which may not be taken from the textbook), as time allows.

Homework: The best way to learn mathematics is by doing mathematics. *Problem Sets* will be assigned and collected regularly. A subset of these problems will be graded based on correctness, clarity, and style/creativity. The feedback is meant to *improve* your mathematical abilities and communication. *Daily Homework* consisting of readings and problems will also be assigned (but not collected).

Discussions: It is crucial to be able to communicate mathematics with peers. Volunteers may be asked to present solutions and ideas to the class. Please take your turn in this activity.

Quizzes: Quizzes will be given every second week. Quizzes are intended to gauge your understanding of the material while presenting opportunities for you to practice writing proofs in a timed-setting.

Exams: There will be two midterm exams and one cumulative final exam. The schedule is:

Exam	*Date*	*Time and Location*
Exam 1	Tuesday, October 1	In Class
Exam 2	Tuesday, November 5	In Class
Final Exam	Tuesday, December 10	10:00 a.m. – 11:50 a.m., Pearce Hall – Room 224

[1] *The details stated in this course syllabus are subject to change at the discretion of the instructor. Announcements concerning all (if any) changes will be made in a timely fashion.*

Missed/Late Work Policies: The following policies will be followed:

(1) Problem Sets must be turned in by the beginning of class on the day that they are due. Late work will receive no credit. However, you will receive one "No Questions Asked Coupon" allowing you to turn in any one Problem Set late with no penalty.
(2) Make-up exams will only be given if arrangements are made with prior notification and you have a reasonable excuse for missing the scheduled exam. If you must miss an exam for an unforeseen, excusable absence, you must provide proper documentation for that absence. Make-up exams may be administered for exceptional circumstances and only by the discretion of the instructor. No make-up exams will be granted for the final examination.

Course Grades: Final grades will be determined as follows:

Task	Percentage of Grade
Problem Sets	20%
Quizzes	15%
Exams	20% each
Final Exam	25%

Percentage Grade	Lowest Letter Grade Earned
$\geq 90\%$	A−
$\geq 80\%$	B−
$\geq 70\%$	C−
$\geq 60\%$	D−

Classroom Atmosphere: A part of learning is making mistakes. We want to establish a classroom atmosphere where the inevitable false starts and mistakes become an opportunity to improve – not an opportunity for embarrassment. Please be constructive and polite in questioning your colleagues in class.

Expectations and Tips for Success: I ask that you have a well-defined sense of professionalism, that you always put forth your best effort, and that you develop a sense of responsibility to your educational community. I ask that you exhibit a persistent desire to learn. In return I will provide you with significant support. Also:

- Be positive, open, and responsive to feedback.
- Be an active participant - this includes being responsible for material when a class is missed, participating fully in classroom activities (please, turn your cell phones off during class), critically thinking about the mathematics during and outside of class. *In order for this class to be successful, it is imperative that you commit to coming to class regularly, that you commit to coming to class prepared, and that you commit to participating in class!*
- Be committed, take pride in your work, and take your work seriously.
- Be patient with yourself - it takes time to master newly learned things. Ask for assistance when it is needed. Constantly try to improve yourself as a mathematician.
- Be academically honest. You will be expected to submit only work that is your own. This will help us gauge your understanding, progress, and abilities for the material. Although you are encouraged to work together as you study, you should not submit anything that you do not understand or is not written in your own words. You are obligated to adhere to the CMU Policy on Academic Integrity.
- Starting with the first class, study in-depth and regularly.
- It is tempting to just copy available solutions. However, struggling through the exercises on your own is an important phase of the learning process.
- Get help as soon as you need it: ask questions in class and office hours; form a study group with your classmates; consider getting a tutor, etc.
- For exam preparation, practice exercises that have not been assigned.
- Everyone wants you to succeed. Please speak with me regarding any concerns you may have.
- Relax and have fun with the course!

Special Needs: CMU provides students with disabilities reasonable accommodation to participate in educational programs, activities, or services. Students with disabilities requiring accommodation to participate in class activities or meet course requirements should first register with the office of Student Disability Services (Park Library, Suite 120, telephone: 989-774-3018, TDD 989-774-2568), and then contact me as soon as possible.