MATH 301 Elementary Number Theory   **Gary dela Pena, Ph.D.**
Section 001, Spring 2019   **Office**: Exploratory Hall 4415
Lecture: MW 5:55P–7:10P, Peterson Hall 2413   **Office Hours**: MW 4:00P–5:00P
email: gdelape2@gmu.edu   TR 3:00P–4:00P
       By Appointment

Prerequisites: 6 math credits.

Course Objectives: To understand and be able to make use of the concepts of prime numbers, factorization, congruences, and Diophantine equations, applications of congruences and cryptography.

Textbook: Rosen, Kenneth; *Elementary Number Theory and its Applications*, 6th Edition, Pearson, 2010.

Grading : Your grade will be determined out of a possible 360 points:

Tests (2)	160 points (80 points for each test)
Comprehensive Final exam (1)	120 points
Homework (8)	80 points (10 points per homework set)
Total	360 points

Tests: There will be two (2) midterm tests and a comprehensive final exam. It is expected that students will take the test in class at the scheduled time.

Homework Sets: There will be a total of ten (10) Homework Sets. Each homework set will consist of 5 problems and are due one week after they are handed out. The highest possible score for a Homework set is 10 points. The two (2) lowest homework grades will be dropped.

Grading: Grades will be assigned according to the following scale:

A	A−	B+	B	B−	C+	C	C−	D	F
100–93	92–90	89–87	86–83	82–80	79–77	76–73	72–70	69–60	59–0

Attendance: The importance of class attendance cannot be over emphasized. Regular and prompt attendance is a must. In the event that you must miss class avoid falling behind by completing the missed assignment described in the attached class schedule. Remember that if you missed a lecture session you get a zero as your grade for that class' worksheet.

Make–up Exams: If you are unable to be in class on the day of a test you must notify me beforehand (in person or by-mail) to make arrangements for a make-up test. The make-up test will be different and more difficult than the in-class test. Makeup exams will only be given to students with an acceptable excuse. The only acceptable excuses are **religious holy day, family emergency, school sponsored event, job interviews, or sickness**. All absences require documentation, for example, You must notify me of any religious holy days within the first 2 weeks of the semester. **All other absences will be given a zero for that test. No exceptions!**

Important Dates

January 29: is the last day you can add a class. If your name is not on my class roll then you cannot take this class.

February 05 Last day to drop with no tuition penalty.

February 26–March 25: Selective Withdrawal Period. If you stop attending classes and plan to withdraw from the course, it is your responsibility to withdraw from the course. You will not be able to withdraw yourself from the course after the above dates. If you do not withdraw before March 25 and you stop attending classes your final Grade will be an F.

Students with Disabilities: If you have a documented learning disability or other condition that may affect academic performance you should:

1. Make sure this documentation is on file with Office for Disability Services (SUB I, Rm. 4205; 993-2474;http://ods.gmu.edu) to determine the accommodations you need; and

2. Inform me so we can discuss your accommodation needs.

Cellular Telephones in the Classroom Students must turn off all cellular telephones and other communication devices when in the classroom. Students whose cellular telephones interrupt instruction will be asked to leave the classroom. Emergency personnel only who are on call and must be available by telephone should notify the instructor at the beginning of the course and should place their emergency phones on vibrate mode and answer such calls outside the classroom

Policy on Academic Dishonesty GMU is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. It is the responsibility of each student to ensure that other persons are not permitted access to answers to exams or quizzes or assignments which are required to be the sole work of each student. **IF A STUDENT IS SUSPECTED OF ACADEMIC DISHONESTY ON ANY EXAM OR QUIZ OR HOMEWORK REQUIRED TO BE THE SOLE WORK OF THE STUDENT, THE FOLLOWING PROCESS WILL APPLY**:

At a minimum, a ZERO (0) on that exam or quiz or assignment and incident reported to the Honor committee.

See *academicintegrity.gmu.edu* for a copy of the Honor Code.

Obtaining Help: There are many outlets available for you to get help in this class. The Math Tutoring Center, is in the Johnson Center room 344 and offers free tutoring to Math students. I highly recommend using it. The schedule of the tutoring center can be found at *http://math.gmu.edu/tutorcenter.htm.*

E-mail and Blackboard: E-mail is an effective form of communication outside the classroom. I frequently send announcements through email so make sure that you activate and check your GMU email account regularly. Even students from outside universities are required to use their George Mason email for communication. Please put Math 301 in the subject field anytime you send me an e-mail. For privacy purposes, all email communications will only be done using GMU email accounts. I will be using Blackboard in this class to post class announcements, grades and other important information pertaining to the class. You can access this by going to mymason.gmu.edu and logging in using your NetID.

Unscheduled and Late Closings: If the university has an unscheduled closing-because of weather or some other unforeseen occurrence you should assume that we will pick up with the schedule where we left off. In particular, if a test was scheduled for a day in which school was canceled or an assignment was due that day you should assume that the test will be given or the assignment will be collected the next time class meets. If the university has a late opening on a class day we will begin class at the time the university opens. A test scheduled for a day the university opens late will be postponed until the next class day. Make sure you check your GMU e-mail account for any announcements.

The following calendar gives a timetable for the course and the list of sections in the textbook, with suggested problems. **The schedule is subject to change**. (HW#) indicates Homework number; Homework is due on the second meeting of the week (Wednesdays)

Date	Section	Suggested Problems
Week 1 1/21-1/23	1.3 Mathematical Induction	2–10, 12, 13, 14, 20, 21 24, 26, 27
Week 2 (HW1) 1/28 - 1/30	1.5 Divisibility	1–22, 26, 27, 28, 30, 31, 36–43
	3.1 Prime Numbers	1, 3, 6, 7, 8, 9, 12, 14, 15, 16, 17, 18, 19, 26, 27, 28
Week 3 (HW2) 2/04-2/06	3.2 The Distribution of Primes	1, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 18
	3.3 Greatest Common Divisors & their Properties	1–14, 17, 18, 19, 20, 25, 27, 31
Week 4 (HW3) 2/11-2/13	3.3 Greatest Common Divisors & their Properties	1 – 14, 17, 18, 19, 20, 25, 27, 31
	3.4 The Euclidean Algorithm	1–10, 14
Week 5 (HW4) 2/18-2/20	3.5 The Fundamental Theorem of Arithmetic	1–10, 11, 28, 29, 30, 31, 34, 35, 36
	3.6 Factorization Methods	1–4
Week 6 (HW5) 2/25-2/27	3.7 Linear Diophantine Equations	1–10 odd, 13–18 odd
	4.1 Introduction to Congruences	1–4, 6–17, 20–23, 25, 27, 29, 31, 32
Week 7 3/04-3/06	4.1 Introduction to Congruences	1–4, 6–17, 20–23, 25, 27, 29, 31, 32
	TEST I/MARCH 6	**1.3, 1.5, 3.1–3.7**
Week 8 3/11–3/15	**SPRING BREAK**	
Week 9 (HW6) 3/18-3/20	4.2 Linear Congruences	1–15 odd, 19
	4.3 The Chinese Remainder Theorem	1–12, 16, 17, 20, 21
Week 10 (HW7) 3/25-3/27	6.1 Wilson's Theorem and Fermat's Little Theorem	1–22 odd, 27, 29, 34, 41
	6.2 Psuedoprimes	1–19 odd
Week 11 (HW8) 4/01-4/03	6.3 Euler's Theorem	1–12 odd, 17, 19
	7.1 The Euler Phi–Function	1–8, 12, 13, 14, 17, 19
Week 12 4/08-4/10	7.2 The Sum and Number of Divisors	1–4, 7–14, 20, 21
	TEST II/APRIL 10	**4.1–4.3, 6.1–6.3**
Week 13 (HW9) 4/15-4/17	7.3 Perfect Numbers and Mersenne Primes	1–14, 15
	7.4 Mobius Inversions	1–6, 10, 13, 14, 19, 21
Week 14 (HW10) 5/22-5/24	8.1 Character Ciphers	1–14
	8.2 Block and Stream Ciphers	1–10, 13, 17
Week 15 4/29-5/01	8.3 Exponentiation Ciphers	1–6
	8.4 Public Key Cryptography	1–18
Week 16 5/06	8.4 Public Key Cryptography	1–18
FINAL EXAM, MAY 13, 4:30P 7:15P		