Point Loma Nazarene University
Math 3012 Number Theory with Proofs
Spring 2020 (2 units)

Time and Place: MWF 7:25-8:20 a.m. RS295

Instructor: Maria Zack, Ph.D.

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Office Number: S222

Office Hours:

Monday	8:30-9:30 a.m.
Tuesday	9:00-10:00 a.m.
Wednesday	8:30-9:30 a.m.
Thursday	3:00-4:00 p.m.
Friday	3:30-4:30 p.m.

These are the hours that I will definitely be available. You can come by my office any time and if I am free I will help you. You can also email me to make an appointment. If you have a question or just want to hang out, come by my office.

Text: *Elementary Number Theory* by Gareth Jones and J. Mary Jones

Catalog Description:
MTH 3012 - Number Theory with Proofs (2)
An introduction to proofs using the study of natural numbers, integers, prime factorization, divisibility, congruences, multiplicative functions, continued fractions, quadratic residues. Methods used include investigation, conjecture, inductive and deductive proofs.
Prerequisite(s): MTH 1074

Learning Outcomes:

- Students will be able to write proofs.
- Students will be able to demonstrate facility with algebraic structures.
- Students will be able to speak about their work with precision, clarity and organization.
- Students will be able to write about their work with precision, clarity and organization.
- Students will collaborate effectively in teams.
- Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand.
- Students will be able to gather relevant information, examine information and form a conclusion based on that information.

A word about proofs:
The best way to learn to write proofs is to practice writing them. There will be a great deal of time in class devoted to the appropriate structure for a mathematical proof. You will be most successful in this course if you participate in all of the in-class proof writing activities, if you stay current with your homework and if you re-write proofs that have been returned to you containing errors (either on homework or exams).

Grading:
The components of the grades:

Homework	260
Projects and Activities (2-3)	120
"Proof of the Week"	120
Exam	200
Final	300
Total Points	1000

Approximate minimal points required to obtain a given grade are:

	A	**B**	**C**	**D**
+		(875, 900)	(775, 800)	(675, 700)
	[925, 1000]	[825, 875]	[725, 775]	[625, 675]
-	[900, 925)	[800, 825)	[700, 725)	[600, 625)

Note that scores of 599 or lower will result in an F.

Homework:
Homework will be assigned each day at the end of class. All homework assigned in a week will be **due at the start of class the next Wednesday**. No late homework will be accepted except by prior arrangement or with a documented emergency. Homework assignments are posted in Canvas. The object of the homework is to learn how to do the problems so I expect to see calculations on your homework using the terminology and methods of the class and not just the answer. A random selection (the same for all people) of the problems will be graded on any homework assignment.

Projects and Activities:
During the semester you will be assigned 2-3 activities or projects that may require group work outside of class.

Proof of the Week:
There will be five of these proofs assigned throughout the semester. The due dates for the proofs are on the class schedule.

Exams:
There is one in-class exam. If you do not take an exam you will receive a zero for it. Late exams may be taken only by prior arrangement or with a documented emergency. I must participate in the decision for you to miss an exam; this means that you need to phone me before missing an exam.

Final:
The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student. The final for MTH3012 is a take-home exam and will be due at the final exam time **FRIDAY MAY 2 FROM 7:30 -10:00 AM. You will need to load your work into Canvas as well as turning in a hard copy of the test so be sure that your writing is clear.**

University Mission:
Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Department Mission:
The Mathematical, Information, and Computer Sciences department at Point Loma Nazarene University is committed to maintaining a curriculum that provides its students with the tools to be productive, the passion to continue learning, and Christian perspectives to provide a basis for making sound value judgments.

Attendance:
Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day.

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See Attendance Policy in the in the Undergraduate Academic Catalog.

Class Enrollment:
It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

Academic Accommodations:
While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

Academic Honesty:
Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See the catalog for definitions of kinds of academic dishonesty and for further policy information.

Copyright Protected Materials:
Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

Credit Hour:
In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 2-unit class delivered over 15 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Schedule Details:
Please pay special attention to the calendar for this class. It has been put into your schedule as a MWF class, but we will only need to meet two times per week since this is a 2-unit class. The three slots allow for some flexibility around my university responsibilities. The class will typically meet Monday and Wednesday, but there are some weeks when we will make use of Friday. Please pay special attention to the schedule and get it into your calendar. I will work to remind you in advance of when we will not be following the MW pattern, but if you look at the schedule you can see peach slots where there are some changes and days marked in blue are for projects (some done in groups).

Monday	Tuesday	Wednesday	Thursday	Friday
13-Jan **NO CLASSES**	14-Jan NO CLASS	15-Jan Intro Theorems Online Syllabus Class HW	16-Jan	17-Jan
20-Jan **MLK DAY**	21-Jan	22-Jan Intro Theorems	23-Jan	24-Jan
27-Jan Intro Theorems Proof of the Week #1	28-Jan	29-Jan Intro Theorems	30-Jan	31-Jan
3-Feb Group Proofs	4-Feb	5-Feb Intro Theorems	6-Feb	7-Feb Euclidean Algorithm Project
10-Feb Euclidean Algorithm Discussion	11-Feb	12-Feb Jones Chapter 1 Proof of the Week #2	13-Feb	14-Feb
17-Feb **PROJECT - NO CLASS** Induction	18-Feb	19-Feb Induction Discussion Jones Chapter 2	20-Feb	21-Feb
24-Feb Jones Chapter 2 Proof of the Week #3	25-Feb	26-Feb Jones Chapter 2	27-Feb	28-Feb
2-Mar Jones Chapter 2 Exam Review	3-Mar	4-Mar **EXAM**	5-Mar	6-Mar
9-Mar **SPRING**	10-Mar **BREAK**	11-Mar **SPRING**	12-Mar **BREAK**	13-Mar **SPRING**
16-Mar Jones Chapter 2 and 3 Proof of the Week #4	17-Mar	18-Mar Jones Chapter 3	19-Mar	20-Mar
23-Mar Jones Chapter 3	24-Mar	25-Mar Jones Chapter 3	26-Mar	27-Mar
30-Mar Jones Chapter 3 Proof of the Week #5	31-Mar	1-Apr Jones Chapter 4	2-Apr	3-Apr
6-Apr Jones Chapter 4	7-Apr	8-Apr **GROUP PROJECT** Lemma 5.1 in Teams	9-Apr **EASTER**	10-Apr **EASTER**
13-Apr **EASTER**	14-Apr	15-Apr Lemma 5.1 presented in teams Jones Chapter 5	16-Apr	17-Apr
20-Apr Jones Chapter 5	21-Apr	22-Apr Jones Chapter 11 Final Exam Preparation	23-Apr	24-Apr
27-Apr	28-Apr	29-Apr	30-Apr	1-May **FINAL EXAM: Take Home Due 7:30-10:00 AM**