

Math 330 – 01
Number Systems
<https://tinyurl.com/35d3cw56>

Spring 2022 MWF 8:00 - 9:30 a.m. WH-100B

Instructor: Fernando Guzmán WH-116
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Office hours: M 10:00 - 11:00 a.m.
(subject to change) T 4:00 - 5:00 p.m.
F 10:00 - 11:00 a.m.
or by appointment

Textbook: The Art of Proof
M. Beck and R. Geoghegan
Springer, 2010

Add/Drop deadline: Monday Feb. 07

Grading: the course grade will be based on:

- class participation,
- collected homework,
- board presentations,
- two short tests, and
- cumulative midterm, and final exams.

Homework	Mondays	20%
Test 1	Fri. Feb. 18 (class time)	10%
Midterm	Mon. Mar. 23 (class time)	20%
Test 3	Mon. Apr. 24 (class time)	10%
Final Exam	??? May. 1? T.B.A.	30%
Class participation	Daily	10%

This course is a 4-credit course, which means that in addition to the scheduled lectures, students are expected to do at least 9.5 hours of course-related work each week during the semester. This includes things like: completing assigned readings and homeworks, studying for tests and examinations, preparing written assignments, and other tasks that must be completed to earn credit in the course.

The purpose of this course is twofold. On one hand, it explores the properties of different number systems, including the natural numbers \mathbb{N} , the integers \mathbb{Z} , the rational numbers \mathbb{Q} , and the real numbers \mathbb{R} . On the other hand, it presents those properties in a logical fashion, so that it will be clear what properties are consequences of others properties. There is a heavy emphasis on proofs, exploring a number of proof methods. This includes **proofs by induction**, which students are expected to master in the first half of the course.

Writing is an essential part of the communication among mathematicians. For that reason, clear and neat writing is emphasized. This course is a Harpur College W course; hence, it may be used to satisfy the all-college writing requirement.

By the end of the semester students are expected to be familiar with the basic properties of the number systems, and be able to prove most of those properties from initial principles (axioms). Those proofs will come sometimes from class notes, sometimes from the textbook, but most of the time, from the student's own work. In any case, the student is expected to present clear and logically sound arguments in the proofs.

We plan to cover most of the material in parts I and II, following closely the order and logic framework of the textbook. If time allows, we will go into some of the topics in part III. Even though the book includes proofs for some propositions, most of the proofs are left as exercises for the student. We plan to present in class some of these proofs, with the remaining left as homework. Some of those homework proofs will be collected every week, and some will be presented on the board by students.

One of the goals of this course is that you learn to distinguish correct from incorrect proofs. You will be given plenty of examples of correct proofs in class.

- You are encouraged to discuss homework problems with classmates, but such discussions should not include the exchange of any written material.
- No problem should be discussed with anyone other than classmates.
- Collaborative work should be explicitly acknowledged in the handed-in homework.
- Writing of homework problems should be done on an individual basis.
- Outside references for material used in the solution of homework problems should be **fully** disclosed. References to results from the textbook and/or class notes should also be included.

Classroom Environment Everyone has the right to be addressed by the name and pronouns that correspond to their gender identity, including non-binary pronouns, for example: they/them/theirs, ze/zir/zirs, etc. Rosters do not list gender or pronouns so you may be asked to indicate the pronouns you use so that I don't make assumptions based on your name and/or appearance/self-presentation (you are not obligated to do so). If you use a chosen name, please let me know. Chosen names and pronouns are to be respected at all times in the classroom. Mistakes in addressing one another may happen, so I encourage an environment of openness to correction and learning. I will not however, tolerate repeated comments which disrespect or antagonize students who have indicated pronouns or a chosen name. Chosen name and personal pronouns may evolve over time, so if at any point during the semester you would like to be addressed differently, please let me know.