

MATH 8980: GRADUATE SEMINAR

Axiomatic Set Theory

MW 7:00 PM – 8:15 PM | DSC 111 | Dr. Roslanowski

Set Theory is commonly employed as a foundational system for the whole of mathematics, particularly in the form of Zermelo–Fraenkel set theory with the axiom of choice. Beside its foundational role, set theory also provides the framework to develop a mathematical theory of infinity. Its foundational appeal, together with its paradoxes, its implications for the concept of infinity and its multiple applications, have made set theory an area of major interest for logicians, mathematicians, and philosophers of mathematics.



Cantor



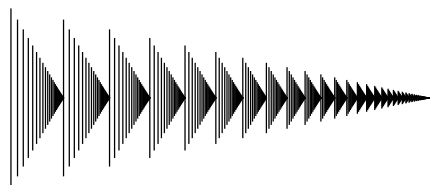
Roslanowski

Textbook: *Lecture Notes* authored by the instructor will be available to students through Canvas.

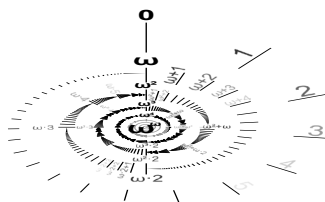
Pre-requisites: [permission of instructor](#)

We will start with some basic Set Theory topics, including ordinal numbers, ordinal arithmetic, and transfinite induction. (You can use such induction to prove that there exists a set $B \subseteq \mathbb{R}^2$ which intersects every straight line in exactly two points. Try it!)

A graphical "matchstick" representation of the ordinal ω^2 . Each stick corresponds to an ordinal of the form $\omega \cdot m + n$ where m and n are natural numbers:



Representation of the ordinal numbers up to ω^ω . Each turn of the spiral represents one power of ω :



We will discuss consequences of Axiom of Choice in Algebra and Analysis and then we will move to cardinal numbers and cardinal arithmetic touching on some recent developments in the area. We will finish the semester with principles like Jensen's \diamond or Martin's Axiom.

Want to know more? Enroll in this course for Spring 2022!

For More Information:

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