

MATH 4030/8036: MODERN ALGEBRA

TR 5:30 PM – 6:45 PM | Dr. Roslanowski

Topic description:

Algebra (from Arabic: الجبر (*al-jabr*, meaning "reunion of broken parts" and "bonesetting")) is one of the broad parts of mathematics, together with number theory, geometry and analysis. In its most general form, algebra is the study of mathematical symbols and the rules for manipulating these symbols; it is a unifying thread of almost all of mathematics. It includes everything from elementary equation solving to the study of abstractions such as groups, rings, and fields.

Textbook: [Stahl, Saul. *Introductory Modern Algebra: A Historical Approach*, 2nd ed. Hoboken: John Wiley & Sons, 2013.](#) Instructor's *Lecture Notes* covering the material will be available to students through Canvas.

Official course content description: This course begins with topics that should be familiar (such as ruler-and-compass constructions, and modular arithmetic) and builds upon this foundation through polynomial rings up to fields and basic group theory.

We will start with discussing complex numbers and equations in complex numbers. We will address two questions: what does it mean for an equation to be solvable in radicals and what does it mean for a geometric configuration to be constructible. We will show that the regular 17-sided polygon is ruler-and-compass constructible (without actually doing the construction though). We will show solvability of cubic and quartic equations, investigate modular arithmetic, the rings of polynomials, groups of permutations and much more! All this in a relaxed but very formal, proof-centered style.

$$\begin{array}{r} x^3 + x + 1 \overline{) x^5 + x^4 + x^2 + x + 1} \\ \underline{x^3 + x^3 + x^2 + x + 1} \\ x^4 + x^3 + x^2 + x + 1 \\ \underline{x^3 + x^2 + x + 1} \\ x^4 + x^2 + x + 1 \\ \underline{x^3 + x^2 + x + 1} \\ x^2 \end{array}$$

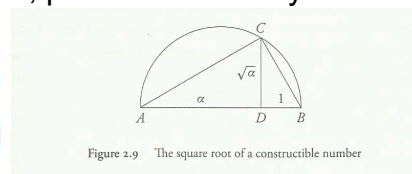


Figure 2.9 The square root of a constructible number

Don't wait! Enroll in this course for Fall 2021!

For More Information:

Dr. Roslanowski | 402.554.3105 | aroslanowski@unomaha.edu