Philosophy 415: History and Philosophy of Mathematics

Short Course Description: This course is an introduction to formal structures, mathematical logic and metalogic in a philosophical and historical context. In it, we'll learn some of the most important results and methods of philosophical and mathematical logic in the twentieth century, with a view to their application to contemporary philosophical problems and questions. Because we will pursue these questions of application, this is not simply a course in the "philosophy *of* mathematics" in the usual sense, but just as much an exploration of the *philosophical* significance of logic, metalogic, and formal results. We will explore these results rigorously but with a minimum of unnecessary detail and complication, and always keeping in mind their relevance to the leading questions of traditional philosophy and contemporary thought about the nature of human life.

After an introduction to elementary set theory through its historical development by Cantor, Frege, Russell, we will read in detail Frege's 1884 *The Foundations of Arithmetic*, which has been called "the first philosophically sound discussion of the concept of number in Western civilization," and consider Frege's realist and Platonist approach to number in critical dialogue with the contrasting approaches of Hilbert's formalism and Brouwer's intuitionism. Following this, we will consider transfinite sets and the nature of infinity, formal paradoxes, model theory, computability theory and Turing machines, and conclude with a proof sketch of Gödel's incompleteness theorems. We will then explore some recent provocative applications of formal structures and results to problems in the history of philosophy, philosophy of mind, and political philosophy in texts by Wittgenstein, Putnam, Priest, Maddy, and others.

Prerequisite: Philosophy 356 (Symbolic Logic) or comparable experience with symbolic logic.