Philosophy of Logic
The Concept of Completeness

CONTACT INFORMATION

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THIS COURSE

The desire to fully individuate and comprehensibly codify the modes of reason or categories of thought has played central but shifting roles in the history of philosophy and science. This completeness concept attained its mature, scientific form in Kurt Gödel’s 1929 thesis, where the idea of a purely formal logical system being fully adequate to the subject matter it was designed to encode was ratified with a rigorous mathematical proof. This result ushered in a paradigm of scientific research: with the fields of proof-theory and model-theory being clearly delineated and the relationship between them well understood, logic became a branch of modern mathematics.

The completeness theorem of Gödel 1929 is in a sense elementary, its proof easily conveyed to non-experts. The question that the theorem settles is, moreover, natural and at the heart of logical thinking. For these reasons historians have expressed wonder as to how it took so long for experts to discover its proof. The answer to this question is that prior to the work of Gödel, and even for many years afterwards, almost no one thought of logical completeness as we do today. Yet his concept has such a grip on us today that we struggle to understand the rival, or complimentary, notions that logicians have had. What were these ways of thinking about completeness, what were their merits, and how did the prevailing concept of logical completeness emerge from them? Our interest is to understand the network of ideas that preceded the prevailing concept, in order to appreciate that even asking the question that Gödel answered was a major intellectual achievement.

TEXTS

Anticipated reading will be from the following sources. Some of these texts will be studied in full detail; others will only be read in excerpt. Many of these books would be quite expensive to acquire, so my plan is just to distribute them prior to each class. Our main focus will be on texts marked
†. Other texts will serve either as commentaries on these or in filling in the historical context.


‡Aristotle, c. 350 BCE. Prior Analytics Book I.


†Gödel, K. 1930a: “Lecture on completeness of the functional calculus,” in cw vol III.

Goldfarb, W. “Introductory note to Gödel 1930a.”


REAQUIREMENTS

Students seeking a grade are asked to write an essay of historical, mathematical, or philosophical significance. My joints are pretty loose: you may be creative with the sort of project you pursue, and I will be happy to appreciate it according to its merits without any preconceptions of what a good term paper should be like. A good rule of thumb is to try to write an essay that a reasonable person could be expected to want to read a second time.

NOTE

Please be aware of the University’s policies regarding academic honesty, anti-discrimination, and access to education for students with disabilities.

Here is the web-page of the office for students with disabilities:

http://www.nd.edu/~osd/NEWHOMEPAGE.htm

Here is the Philosophy Department’s web-page devoted to academic honesty, with links to information about plagiarism and the University’s honor code:

http://philosophy.nd.edu/undergraduate-program/honesty/

In addition I am someone you can approach if you have concerns about discrimination or proper scholarly behavior, whether or not the concern is related to this course.