1 Office information

411 Malloy Hall
Monday 11am-2pm

2 This course

In the 20th Century, a formal theory of proofs was conceived by David Hilbert and realized by Jacques Herbrand, Kurt Gödel, and Gerhard Gentzen. We hope to appreciate the conception and realization of proof theory as deeply as possible. To that end, we will work through classical results of the proof theory of first order logic and then read the original manuscripts of Herbrand, and Gentzen. We’ll also read a bit of secondary historical and philosophical literature on those primary texts. Finally, we’ll look at a broader selection of historical papers, some more contemporary results and ideas, according to your interest.

Below is a more detailed outline of the course.

In the initial weeks, I will present the sequent calculus for classical, first order logic and some of the classical results of logic: theorems of completeness, compactness, cut-elimination, Herbrand, Kreisel, Craig, Beth. My exposition will follow Buss 1998a and Buss 1995. Then I will present a sequent calculus formulation of arithmetic and some basic applications of cut-
elimination in arithmetic: Parikh’s theorem (as in Buss 1998b), a version of Gentzen’s consistency proof.

With that behind us, we will begin reading papers by Herbrand and Gentzen, as well as the surrounding essays.

Then, as your interests lead you, we can look into more topics in logic (deeper results in ordinal analysis or structural proof theory), read later papers by Kreisel, Parikh, etc., or look into some of the ideas of proof-theoretical semantics and inferentialism. Hopefully a number of you will prepare to present some of this material, so that the latter half of the course is maximally collaborative.

3 Principal texts

Note: Entries marked with a “‡” are available on-line. Those marked with a “†” will be circulated at the appropriate time. Readings from Szabo 1969 should be available as a packet soon. You should endeavor to obtain your own copy of Goldfarb 1971.


4 Supplimentary texts


## 5 Requirements

To earn credit for this seminar, attend and participate regularly and do at least one of the following: write a paper, present some material, or think of something else that I can approve for credit. I encourage you to follow your own interests and chart your own course. You can also audit the course, if you’re mostly interested in hearing what others have to say.

## 6 Note

Please be aware of the University’s policies regarding academic honesty, antidiscrimination, 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.
7 Important dates

March 12  no meeting  Break
April 9  no meeting  Passover
April 16  no meeting  Passover